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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Giannoukakis  
Serial No. : 09/320,767 Examiner: Sorrello, E.  
Filed : May 27, 1999 Group Art Unit:1633  
For : GENE TRANSFER TO PANCREATIC CELLS  
FOR PREVENTION OF ISLET DYSFUNCTION

DECLARATION OF DR. PAUL ROBBINS  
UNDER 37 C.F.R. '132

I hereby certify that this paper is being deposited with the  
United States Postal Service as First Class Mail in an  
envelope addressed to: Assistant Commissioner for  
Patents, Washington, D.C. 20231, on: September 25, 2002

Carmella L. Stephens

41,328

Attorney Name

PTO Registration No.

Carmella L. Stephens

September 25, 2002

Signature

Date of Signature

Assistant Commissioner for Patents  
Washington, D.C. 20231

I, PAUL ROBBINS, do declare:

1. I am co-inventor of the invention disclosed in the above-identified  
application. A copy of my Curriculum Vitae is attached herewith as Exhibit A.

2. The invention disclosed in the above identified application relates to  
methods and compositions for inhibiting pancreatic islet  $\beta$ -cell dysfunction. Specifically, the  
invention relates to the transfer of nucleic acid molecules encoding inhibitors of interleukin-1

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into pancreatic islet  $\beta$ -cells. Such pancreatic islet  $\beta$ -cells can then be transplanted into a host recipient susceptible to a pancreatic disorder for inhibition of pancreatic islet  $\beta$ -cells dysfunction.

3. Insulin-dependent diabetes mellitus (IDDM) is characterized by a local inflammatory reaction in and around the islets of Langerhans followed by selective destruction of pancreatic islet  $\beta$ -cells. In both humans and the non-obese diabetic (NOD) mouse, the immunopathology is characterized by an early onset insulinitis with a significant proportion of the invading cells consisting of T-lymphocytes which are believed to directly damage  $\beta$ -cells by secreting proinflammatory cytokines. Such cytokines include interleukin-1 $\beta$  (IL-1 $\beta$ ) which has been shown to be the initiating cytokine directly responsible for the impairment of glucose-stimulated insulin production in mouse and human islets.

3. Experiments were conducted to test whether recombinant expression of an IL-1 $\beta$  inhibitor in pancreatic islet  $\beta$ -cells could reduce pancreatic islet  $\beta$ -cell dysfunction *in vivo*. The experiments were conducted in NOD mice, a strain of mice susceptible to autoimmune mediated diabetes.

4. As indicated in Figure 1, pancreatic islet  $\beta$ -cells were derived from NOD mice and transfected with recombinant adenovirus or lentivirus vectors expressing either a control LacZ gene (Ad-LacZ or LtV-LacZ) or the interleukin-1 receptor antagonist

protein (IRAP) (Ad-IRAP or LtV-IRAP). IRAP is known to be an inhibitor of IL-1 $\beta$  activity.

5. A total of approximately 400 transduced pancreatic islets were then transplanted into streptozotocin treated NOD mice: 200 control lacZ transduced islets transplanted under one kidney capsule and 200 IRAP transduced islets transplanted under the opposite kidney capsule. Streptozotocin is a compound which is known to selectively kill pancreatic islet  $\beta$ -cells. Thus, the experiment is designed to test the protection afforded to pancreatic islet  $\beta$ -cells expressing an inhibitor of IL-1 $\beta$  activity, *i.e.*, IRAP, when transplanted into an animal model susceptible to development of diabetes.

6. When the transplanted animals began to show signs of diabetes, the animals were sacrificed and the histology of the transplanted islets was examined. Figures 2 and 3 show that Ad-IRAP and LtV-IRAP, respectively, are capable of reducing islet destruction in transplanted NOD mice. Panels A and B are stained for insulin, using anti-insulin antibodies, and demonstrate greater insulin expression in the animals receiving transplanted pancreatic islet  $\beta$ -cells transfected with vectors expressing IRAP (Ad-IRAP and LtV-IRAP) versus control cells (Ad-LacZ and LtV-LacZ). In addition, as depicted in panels C and D there is less white blood cell infiltration around the islets in the animals receiving cells expressing IRAP. The data depicted in Figures 2 and 3 demonstrate that expression of an IL-1 inhibitor is capable of reducing *in vivo* pancreatic islet  $\beta$ -cell destruction.

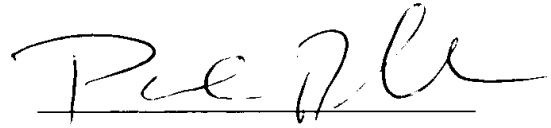
7. In a second set of experiments, NOD animal derived pancreatic islet  $\beta$ -cells were transfected with recombinant adenovirus vectors genetically engineered to express the LacZ, or IRAP genes. The transfected islet cells were then transplanted into streptozotocin treated NOD *SCID* mice (Figure 4). As indicated above, such mice do not have functional pancreatic islet  $\beta$ -cells due to streptozotocin mediated destruction. In addition, since the mice are *SCID* mice, they do not have a functional immune system. Once the transfected pancreatic islets had been transplanted into the NOD *SCID* animals, the animals were challenged with spleen cells derived from a diabetic mouse. Such spleen cells will contain a population of T lymphocytes primed to attack pancreatic islet  $\beta$ -cells.

8. Figure 5 is a summary of the data derived from the T-lymphocyte challenged transplants. The data is presented as number of survival days following T-lymphocyte challenge where n represents the number of animals studied. As indicated, the animals expressing IRAP survived for longer periods of time than the controls, i.e., 37 days (Ad-IRAP) versus 27 days (Ad-LacZ). Thus, the data indicates *in vivo* reduction in pancreatic islet cell destruction in animals expressing an inhibitor of IL-1 $\beta$  activity.

6. I hereby declare further that all statements made herein by my own knowledge are true and that all statements made on information and belief are believed to be true and further that I make these statements with the knowledge that willful false statements

and the like are punishable by fine or imprisonment, or both, under ' 1001 of Title 18 of the  
united States Code and that such willful false statements may jeopardize the validity of the  
application of any patent issuing therein.

Dated: 9/24/02

A handwritten signature in cursive script, appearing to read "Paul Robbins", written over a horizontal line.

Dr. Paul Robbins

O.I.P.E.  
OCT 0-1  
PATENT &

# Transplantation of Genetically Modified Islets

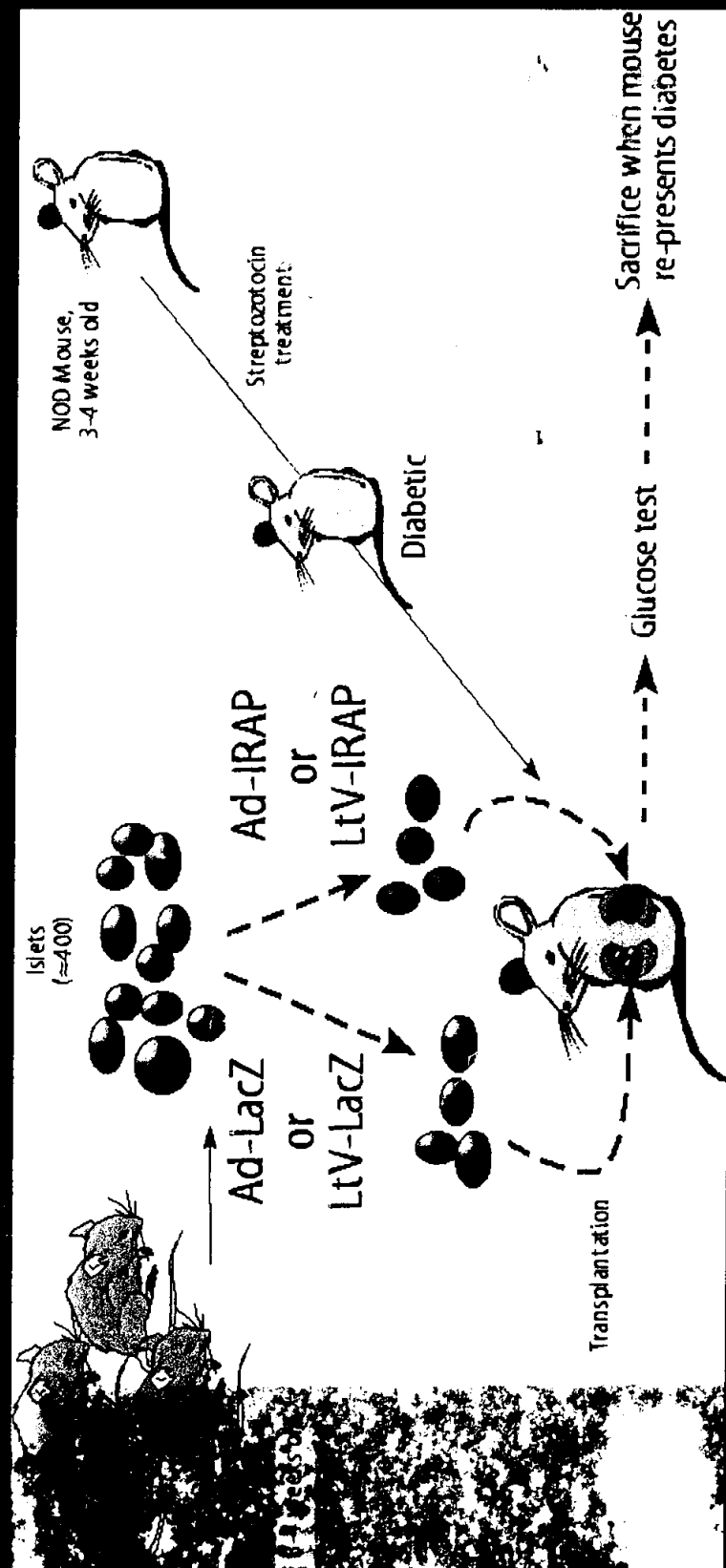


Figure 1

# Ad-IRAP Blocks Islet Destruction in Transplanted NOD Mice

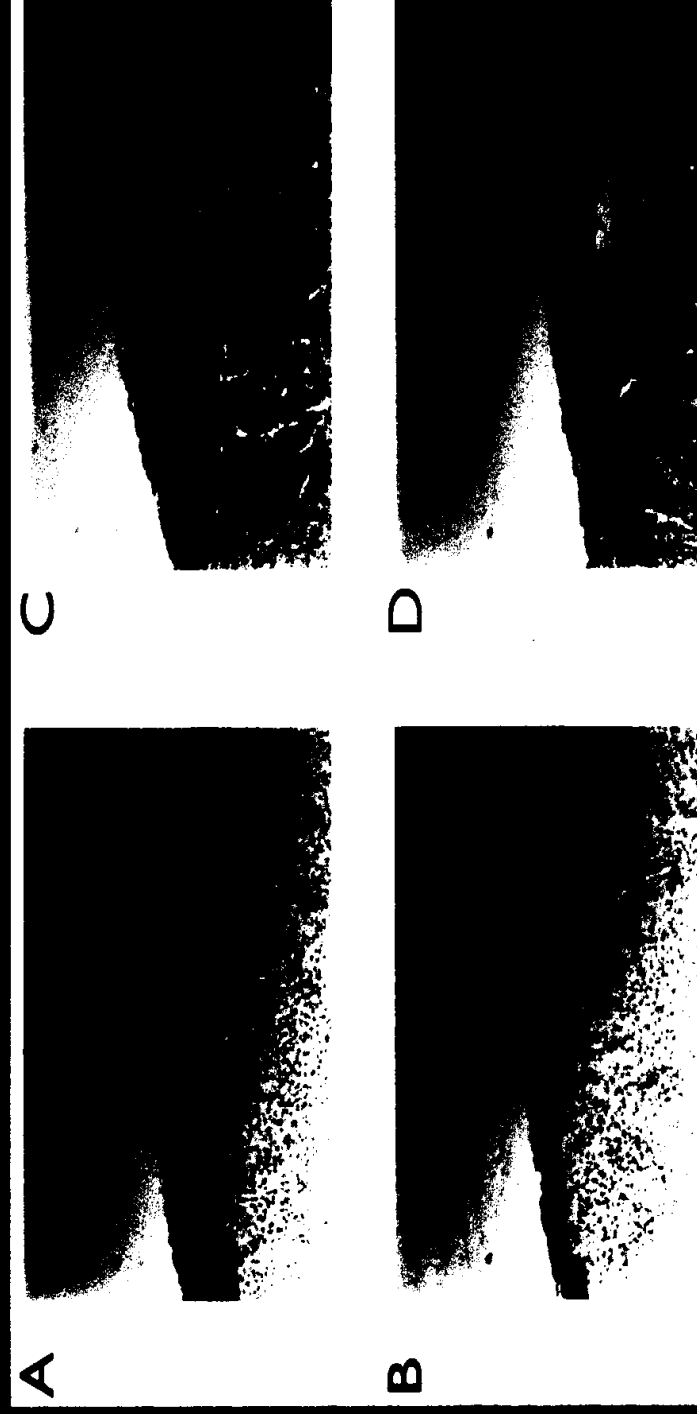


Figure 2

# LtV-IRAP Blocks Islet Destruction in Transplanted NOD Mice

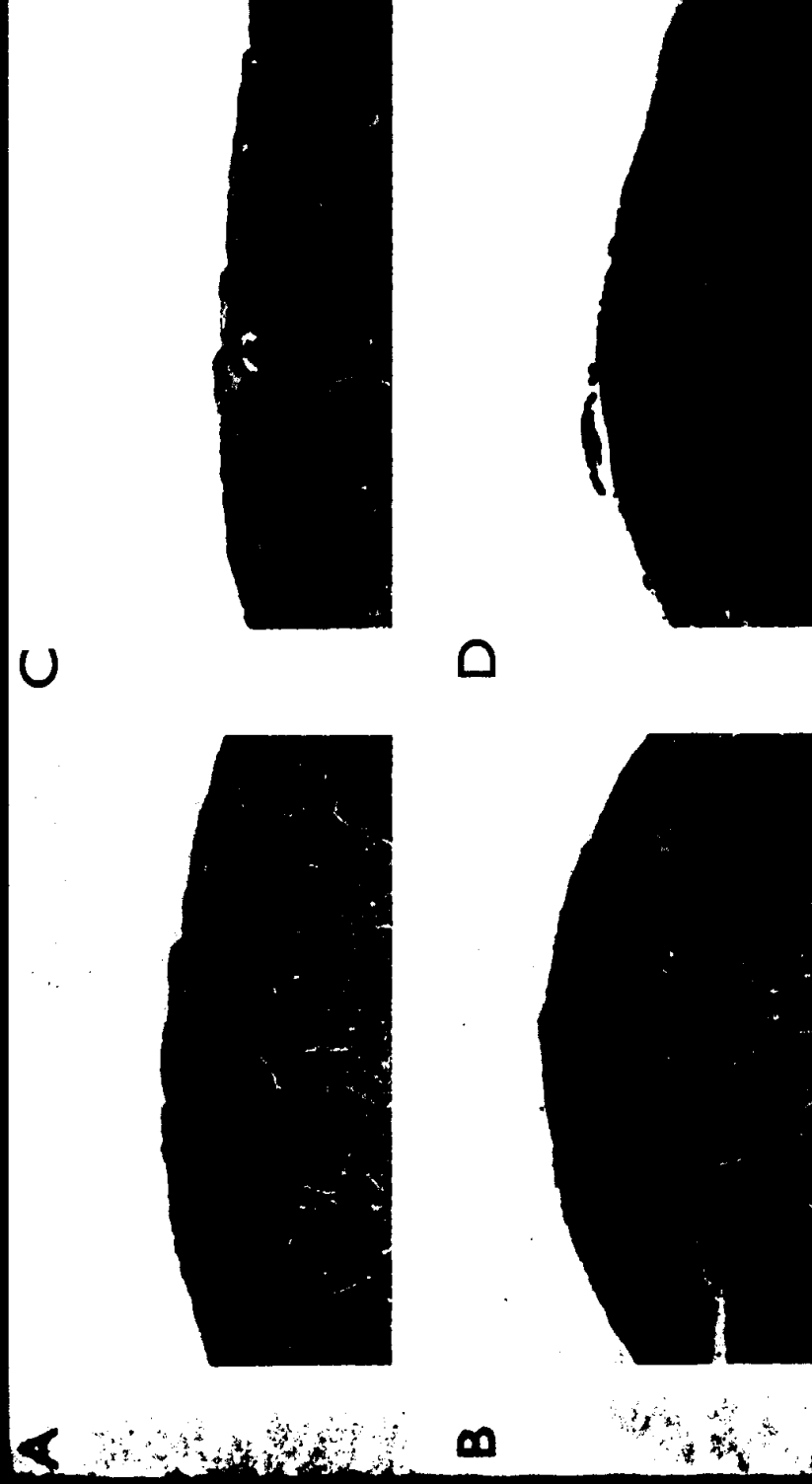


Figure 3



# NOD-SCID Adoptive Diabetic T cell Model

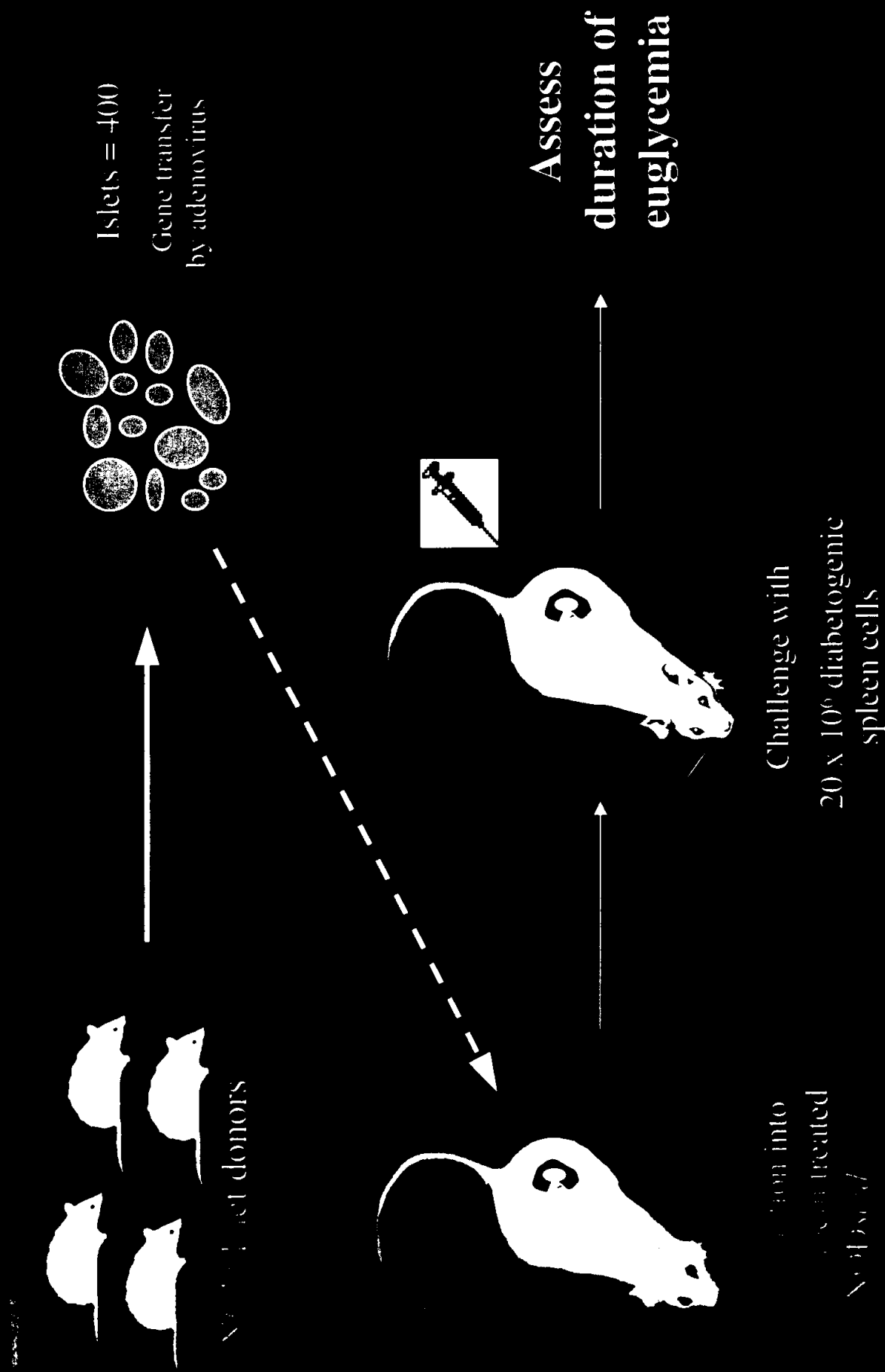


Figure 4

# Summary of T cell Challenged Transplants

<u>Islet Modification</u>	<u>n</u>	<u>mean <math>\pm</math> sd</u>
Unmodified	11	31 $\pm$ 9
Ad-LacZ	10	27 $\pm$ 12
Ad-IRAP	9	37 $\pm$ 14
Non-Tx	27	29 $\pm$ 6

Figure 5

## CURRICULUM VITAE

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### Education

Haverford College Haverford, Pennsylvania, 1976-1980	B.A.	Biology
University of California Berkeley, California, 1980-1985	Ph.D.	Molecular Biology

### Positions Held

Postdoctoral Fellow, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts, 1986-1990

Assistant Professor, Department of Molecular Genetics and Biochemistry, University of Pittsburgh School of Medicine, 1990-1995

Director, Vector Core Facility, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania 1991-present

Associate Professor (with tenure), Department of Molecular Genetics and Biochemistry, University of Pittsburgh School of Medicine, 1996-1999

Interim Director, Molecular and Cellular Oncology Program, University of Pittsburgh Cancer Institute, 1997-2001

Professor, Department of Molecular Genetics and Biochemistry, University of Pittsburgh School of Medicine (2000-present)

Professor, Department of Orthopaedic Surgery, University of Pittsburgh School of Medicine (2001-present)

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## BIBLIOGRAPHY

### Refereed Articles

1. Robbins, P., Rio, D. C., and M. Botchan (1986) trans activation of the simianvirus 40 enhancer. *Mol. Cell. Bio.* **6**:1283-1295.
2. Lenardo, M. J., Staudt, L., Robbins, P., Kuang, A., Mulligan, R. C., and D. Baltimore. (1988) Repression of the immunoglobulin heavy chain enhancer in mouse teratocarcinoma cells is associated with the presence of a novel octamer binding factor. *Science* **243**:544-546
3. Robbins, P. Horowitz, J. and R. C. Mulligan (1990) Negative regulation of *c-fos* expression by the retinoblastoma gene product. *Nature* **346**:668-671
4. Kim, S.-J., Lee, H.-D., Robbins, P. D., Busam, K., Sporn, M. B., and A. B. Roberts. (1990) Regulation of TGF- $\beta$ 1 expression by the retinoblastoma gene product. *Proc. Natl. Acad. Sci.* **88**:3052-3056.
5. Sakai, T., Ohtani, N., McGee, T. L., Robbins, P. D., and T. P. Dryja. (1991) Oncogenic, germline mutations in SP1 and ATF sites in the human retinoblastoma gene. *Nature* **353**:83-86.
6. Kim, S.-J., Onwuta, U. S., Lee, Y. I., Li, R., Botchan, M. R. and P. D. Robbins (1992) The retinoblastoma gene product regulates Sp1-mediate transcription. *Mol. Cell. Biol.* **12**:2455-2463.
7. Kim, S.-J., Wagner, S., O'Reilly, M. A., Lui, F., Robbins, P.D., and M.R. Green. (1992) The retinoblastoma gene product activates expression of the human TGF- $\beta$ 2 gene through transcription factor ATF-2. *Nature* **358**:331-334.
8. Ohashi, T., Boggs, S., Robbins, P., Bahnson, A., Patrene, K., Wei, F.-S., Wei, J.-F., Fei, Y., Li, J., Lucht, L., Clark, S., Kimak, M., He, H., Mowery, P., and J. A. Barranger. (1992) Efficient transfer and sustained high expression of the human glucocerebrosidase gene in mice and their functional macrophages following transplantation of bone marrow transduced by a retroviral vector. *Proc. Natl. Acad. Sci. USA* **89**:11332-11336.
9. Ohtani-Fujita, N., Fujita, T., Aoike, A., Osifchin, N., Robbins, P.D., and T. Sakai. (1993) CpG methylation inactivates the promoter activity of the human retinoblastoma tumor-suppressor gene. *Oncogene* **8**:1063-1067.
10. Jiang, D., Srinivasan, A., Lozano, G., and P. D. Robbins. (1993) SV40 T-antigen abrogates p53-mediated transcriptional activity. *Oncogene* **8**:2805-2812.
11. Bandara, G., Mueller, G. M., Galea-Lauri, J., Tyndall, M. H., Georgescu, H. I., Suchanek, M. K., Hung, G. L., Glorioso, J. C., Robbins, P. D., and C. H. Evans (1993) Intraarticular expression of the interleukin-1 receptor antagonist protein by ex-vivo gene transfer. *Proc. Natl. Acad. Sci.* **90**:10764-10768.
12. Tahara, H., Zeh, H. III, Storkus, W. J., Hurd, S., Pappo, I., Gately, M. K., Gubler, U., Wolf, S. F., Robbins, P. D., and M. T. Lotze (1994) Fibroblasts genetically engineered to secrete interleukin-12 can suppress tumor growth and induce antitumor immunity to a murine melanoma in vivo. *Can. Res.* **54**:182-189.

13. Hung, G. L., Bandara, G., Galea-Lauri, J., Mueller, G. M., Georgescu, H. I., Larkin, L. A., Tyndall, M. H., Robbins, P. D., and C. H. Evans (1994) Suppression of intraarticular response to interleukin-1 by gene transfer to synovium. *Gene Therapy* 1:64-69.
14. Park, K., Choe, J., Osifchin, N. E., Templeton, D., Robbins, P. D., and S.-J. Kim. (1994) The human retinoblastoma susceptibility gene promoter is positively autoregulated by its own product. *J. Biol. Chem.* 269:6083-6088.
15. Calmels, T., Mistry, J. L., Watkins, S., Robbins, P. D., McGuire, R. and J. S. Lazo. (1994) Nuclear localization of the bacterial *Streptoalloteichus hindustanus* bleomycin protein in mammalian cells. *Mol. Pharm.* 44:1135-1141.
16. Osifchin, N., Jiang, D., Fujita, T., Aoike, A., Kim, S.-J., Carroza, M., Sakai, T., and P. D. Robbins. (1994) Identification of a p53 binding site in the human retinoblastoma susceptibility gene promoter. *J. Biol. Chem.* 269:6383-6389.
17. Ohtani-Fujita, N., Fujita, T., Aoike, A., Osifchin, N., Robbins, P.D., and T. Sakai. (1994) Identification of a silencer element in the retinoblastoma susceptibility promoter. *Oncogene* 9:1703-1711.
18. Gao, X., Jaffurs, D. C., Robbins, P. D., and L. Huang. (1994) A prolonged, cytoplasmic expression system delivered by cationic liposomes. *BBRC* 200:1201-1206.
19. Bahnson, A. B., Nimgaonkar, M., Fei, Y., Boggs, S. S., Robbins, P. D., Ohashi, T., Dunigan, J., Li, J., Ball, E. D., and J. A. Barranger. (1994) Transduction of CD34+ enriched cord blood and Gaucher bone marrow cells by a retroviral vector carrying the glucocerebrosidase gene. *Gene Therapy* 1:176-184.
20. Zitvogel, L., Tahara, H., Mueller, G., Wolf, S. F., Gubler, U., Gately, M., Robbins, P.D., and M. T. Lotze. Construction and characterization of retroviral vectors expressing biologically active human interleukin 12. (1994) *Hum. Gene Ther.* 5:1493-1506.
21. Adnane, J. and P. D. Robbins (1995). The retinoblastoma susceptibility gene product regulates Myc-mediated transcription. *Oncogene* 10:381-387.
22. Shao, Z. and P. D. Robbins (1995). Regulation of E2F and Sp1-mediated transcription by cyclins. *Oncogene* 10:221-228.
23. Schwartz, M. A., Lazo, J. S., Yalowich, J. C., Allen, W. P., Whitmore, W., Bergonia, H. A., Tzeng, E., Billiar, T. R., Robbins, P. D., Lancaster, J. R., and B. R. Pitt. (1995) Metallothionein protects against the cytotoxic and DNA damaging effects of nitric oxide. *Proc. Natl. Acad. Sci.* 92:4452-4456
24. Qin, L., Chavin, K. D., Ding, Y., Favaro, J. P., Woodward, J. E., Lin, J., Tahara, H., Robbins, P. D., Shaked, A., Ho, D., Sapolsky, R., Lotze, M. T., and J. S. Bromberg. (1995) Multiple vectors effectively achieve gene transfer in a murine cardiac transplantation model: immunosuppression with TGF- $\beta$ 1 or vIL-10. *Transplantation* 59:809-816.
25. Shao, Z., Ruppert, S., and P. D. Robbins. (1995) The retinoblastoma susceptibility gene product binds directly to TAF<sub>II</sub>250. *Proc. Natl. Acad. Sci.* 92:3115-3119
26. Adnane, J., Shao, Z., and P. D. Robbins (1995). The retinoblastoma susceptibility gene product represses transcription when directly bound to the DNA. *J. Biol. Chem.* 270:8837-8843.

27. Tahara, H., Zitvogel, L., Storkus, W. J., Zeh, H. J., McKinney, T. G., Schreiber, R. D., Gubler, U., Gately, M. K., Robbins, P. D., and M. T. Lotze. (1995) Effective eradication of established murine tumors with interleukin 12 (IL-12) gene therapy. *J. Immunol.* **154**:6466-6474
28. Suzuki, T., Tahara, H., Narula, S., Moore, K. W., Robbins, P. D., and M. T. Lotze. (1995) vIL-10: the human herpes virus 4 cIL-10 homologue, induces local anergy to allogeneic and syngeneic tumors. *J. Exp. Med.* **182**:477-486
29. Mueller, G. M., McKenzie, L. R., Homanics, G. E., Watkins, S. C., Robbins, P. D., and H. S. Paul. (1995) Correction of maple syrup urine disease in mutant human fibroblasts by retroviral-mediated gene transfer. *Gene Therapy* **2**:461-468.
30. Pitt, B. R., Brookens, M. A., Nakayama, D., Mueller, G. M., Robbins, P. D., Watkins, S. C., and R. D. Bland (1995) Retroviral-mediated gene transfer to fetal lamb lung in situ. *Gene Therapy* **2**:344-350
31. Boggs, S. S., Patrene, K. D., Mueller, G. M., Evans, C. H., Doughty, L. A., and P. D. Robbins. (1995) Prolonged systemic expression of human IL-1 receptor antagonist (hIL-1ra) in serum of lethally irradiated mice reconstituted with hematopoietic cells transduced with a retrovirus carrying the hIL-1ra cDNA. *Gene Therapy* **2**:632-638
32. Zitvogel, L., Tahara, H., Storkus, W. J., Clark, M., Nalesnik, M., Gately, M., Robbins, P. D., and M. T. Lotze. (1995) Efficient and therapeutic delivery of interleukin-12 (IL-12) by genetically engineered fibroblasts in murine tumor models. *J. Immunology* **155**:1393-1903
33. Chernajovsky, Y., Adams, G., Podhajcer, O., Mueller, G., Robbins, P. D., and M. Feldmann. (1995) Inhibition of transfer of collagen induced arthritis into SCID mice by gene transfer of spleen cells with retroviruses expressing soluble human tumor necrosis factor receptor. *Gene Therapy* **2**:731-735
34. Tzeng, E., Billiar, T. R., Robbins, P. D., Loftus, M., and D. J. Stuehr (1995) Expression of human inducible NO synthase in a tetrahydrobiopterin-deficient cell line: tetrahydrobiopterin promotes assembly of enzyme subunits into an active dimer. *Proc. Natl. Acad. Sci* **92**:11771-11775
35. Lin, C.W., Robbins, P.D., Georgescu, H. I., and C. H. Evans. (1996) Complex roles for AP-1 during the induction of collagenase and stromelysin in synovial fibroblasts. *Exp. Cell Res.* **223**:117-126
36. Qin, L., Chavin, K. D., Tahara, H., Ding, Y., Favarro, J., Woodward, J., Lin, J., Robbins, P. D., Lotze, M. T., and J. S. Bromberg. (1996) Retrovirus-mediated transfer of viral interleukin-10 (vIL-10) gene transfer prolongs cardiac allograft survival. *J. Immunol.* **156**:2316-2323
37. DeKoskey, S. T., Styren, S. D., O'Malley, M. E., Gross, J. R., Kochanek, P., Marion, D., Evans, C. H., and P. D. Robbins. (1996) Interleukin-1 receptor antagonist suppresses nerve growth factor upregulation following brain injury. *Annals of Neurology* **39**:123-127.
38. Tahara, H., Lotze, M. T., Robbins, P. D., Storkus, W. J., and L. Zitvogel (1995) IL-12 gene therapy using direct injection of tumors with genetically engineered autologous fibroblasts. *Human Gene Ther.* **6**:1607-1624
39. Yang, Y.-Y., Robbins, P. D., and J. S. Lazo. (1998) Differential transactivation of human metallothionein-IIa in cisplatin sensitive SCC25 and resistant SCC25/CP cells. *Oncology Res.* **10**:85-98

40. Otani, K., Nita, I., Macaulay, W., Georgescu, H. I., Mueller, G. M., Robbins, P.D., and C. H. Evans. (1996) Suppression of antigen-induced arthritis in rabbits by ex vivo gene therapy. *J. Immunol.* **156**:3558-3562.
41. Tzeng, E., Robbins, P.D., Pitt, B.R., Geller, D.A., Watkins S.C. Simmons, R.L., Billiar, T.R. (1996) Stable transfer of the human inducible nitric oxide synthase gene to endothelial cells: characterization of enzyme expression and toxicity. *Mol. Med.* **2**:211-225.
42. Berman, R. M., Suzuki, T., Tahara, H., Robbins, P. D., Narula, S. K., and M. T. Lotze. (1996) Cellular interleukin-10 (cIL-10) promotes the acquisition of specific anti-tumor immunity. *J. Immunol.* **157**:231-238.
43. Zitvogel, L., Robbins, P. D., Storkus, W. J., Clarke, M. R., Maeurer, M. R., Cambell, R. L., Davis, G. C., Tahara, H., Schreiber, R. D., and M. T. Lotze. (1996) Interleukin 12 and B7.1 costimulation cooperate in the induction of effective antitumor immunity and therapy of established tumors. *Eur. Jour. Immunol.* **26**:1335-1341
44. Lee, S.-G., Kim, S., Robbins, P. D., and B.-G Kim. (1996) Optimization of environmental factors for the production and handling of retroviruses. *Applied Mico. Biotechnol.* **45**:477-483
45. Maeurer, M. J., Gollin, S., Martin, D., Swaney, W., Bryant, J., Castelli, C., Robbins, P., Parmiani, G., Storkus, W. J., and M. T. Lotze (1996) Tumor escape from immune recognition: Lethal recurrent melanoma in a patient with downregulation of the peptide transporter protein TAP-1 and loss of expression of the immunodominant MART-1/Melan-A antigen. *J. Clin. Invest.* **98**:1633-1641.
46. Learish, R., Ohashi, T., Robbins, P. D., Bahnson, A., Boggs, S. S., Patrene, K., Schwartz, Gieselmann, V., and J. A. Barranger. (1996) Efficient transfer and sustained expression of the human arylsulfatase gene in mice and their functional macrophages following transplantation of bone marrow transduced by a retroviral vector. *Gene Therapy* **3**:343-349
47. Nita, I., Ghivizzani, S., Galea-Lauri, J., Bandara, G., Georgescu, H. I., Robbins, P. D., and Evans, C. H. (1996) Direct gene delivery to synovium: an evaluation of potential vectors *in vitro* and *in vivo*. *Arthritis and Rheum.* **39**:820-828.
48. Byun, J., Kim, S.-H., Kim, J. M., Robbins, P. D., Yim, J., and S. Kim. (1996) Analysis of the relative level of gene expression from different retroviral vectors used for gene therapy. *Gene Therapy* **3**:780-788
49. Rushton, J. C., Jiang, D., Srinivasan, A., Pipas, J. M., and P. D. Robbins. (1997) SV40 T-antigen can regulate p53-mediated transcription independent of binding p53. *J. Virol.* **71**:5620-5623.
50. Ghivizzani, S. C., Kang, R., Georgescu, H. I., Lechman, E. R., Jaffurs, D., Engle, M. J., Watkins, S. C., Tindal, M. H., Suchanek, M. K., McKenzie, L. R., Evans, C. H., and P. D. Robbins. (1997) Constitutive intraarticular expression of human interleukin-1 $\beta$  following gene transfer to rabbit synovium produces all major pathologies of human rheumatoid arthritis. *J. Immunol.* **159**:3604-3612
51. Gerich, T. G., Kang, R., Fu, F. H., Robbins, P. D., and C. H. Evans. (1996) Gene transfer to ligaments and menisci. *Gene Therapy* **3**:1089-1093
52. Doughty, L. A., Patrene, K. D., Evans, C. H., Boggs, S. S., and P. D. Robbins. (1997) Constitutively expressed cytokine antagonists suppress inflammatory markers induced by endotoxin challenge. *Gene Therapy* **4**:252-257

53. Muller-Ladner, U., Roberts, C. R., Franklin, B. N., Gay, R. E., Robbins, P. D., Evans, C. H., and S. Gay. (1997) Human IL-1Ra Gene transfer into human synovial fibroblasts is chondroprotective. *J. Immunol.* **158**:3492-3498
54. Henderson, R. A., Nimmgaunekar, M., Robbins, P. D., Watkins, S. C., Ball, E. T., and O. J. Finn. (1996) Human dendritic cells engineered to express a human epithelial tumor antigen mucin (Muc-1) through retroviral transduction and differentiation of stem cells. *Cancer. Res.* **56**:3763-3770.
55. Kang, R., Marui, T., Ghivizzani, S. C., Nita, I., Georgescu, H., Jun-Kyo Suh, B. S., Robbins, P. D., and Evans, C. H. (1997) Ex vivo gene transfer to chondrocytes in full-thickness articular cartilage defects: a feasibility study. *Osteoarthritis and Cartilage* **5**:139-143.
56. Evans, C. H., Robbins, P. D., Elder, E., Gay, S., Herndon, J. H., Watkins, S. C., Kang, R., Ghivizzani, S. C., Whiteside, T. and Macauley, W. B. (1996) Clinical trial to assess the safety, feasibility, and efficacy of transferring a potentially anti-arthritic cytokine gene to human joints with rheumatoid arthritis. *Human Gene Therapy* **7**:1261-1280
57. Kim, S. H., Ahn, J. S., Tahara, H., Lotze, M. T., Park, C., Robbins, P. D., and S. Kim. Retroviral-mediated IL-12 gene therapy for advanced murine tumors. (1997) *Exp. Mol. Med.* **29**:53-58
58. Rushton, J.J., Steinmann, R., and Robbins, P. D. (1997) Transcriptional regulation of p21 and cyclin D1 and apoptosis by TAFII250 in ts13 cells. *Cell Growth & Diff.* **8**:1099-1104
59. Shao, Z., Seigert, J., Ruppert, S., and Robbins, P. D. (1997) Rb interacts with TAF<sub>II</sub>250/TFIID through multiple domains. *Oncogene* **15**:385-392
60. Wehling, P., Schultz, K. P., Robbins, P. D., Evans, C. H and Reinecke, J. (1997) Transfer of genes to chondrocytic cells of the lumbar spine. *Spine* **22**:1092-1097.
61. Henderson, R. A., Konitsky, W. M., Ball, E. D., Robbins, P. D., and Finn, O. J. (1998) Retroviral expression of MUC-1 human tumor antigen with intact repeat structure and capacity to elicit immunity in vivo. *J. Immunother.* **21**:247-256.
62. Byun, J., Kim, J. M., Kim, S.-H., Yim, J., Robbins, P. D., and S. Kim. (1996) Simple and rapid method for the determination of the recombinant retroviruses titer by G418 selection. *Gene Therapy* **3**:1018-1020
63. Pelletier, J.-P., Caron, J., Evans, C. H., Robbins, P. D., Georgescu, H., Iovanovic, D., Fernandes, J., and J. Martel-Pelletier. (1997) In vivo suppression of early experimental osteoarthritis by IL-1Ra using gene therapy. *Arthritis Rheum.* **40**:1012-1019
64. Couderc, B., Zitvogel, L., Douin-Echinard, V., Djennane, L., Tahara, H., Favre, G., Lotze, M. T., and P. D. Robbins. (1998) Enhancement of anti-tumor immunity by expression of CD70 (CD27L) or CD154 (CD40L) costimulatory molecules on tumor cells. *Cancer Gene Therapy* **5**:163-175
65. Ghivizzani, S. C., Lechman, E. R., Tio, C., McCormick, J., Chada, S., Kang, R., Mule, K. M., Evans, C. H., and Robbins, P. D. (1997) Direct retroviral mediated gene transfer to the synovium of the rabbit knee. *Gene Therapy* **4**:977-982
66. Gerich, T. G., Kang, R., Fu, F. H., Robbins, P. D., and Evans, C. H. (1997) Gene transfer to the patellar tendon. *Knee Surg, Sports Traumatol. Arthrosc.* **5**:118-123



67. Tuetting, T., Gambotto, A., Baar, J., Davis, I. D., Storkus, W. J., Tahara, H., Robbins, P. D., and Lotze, M. T. (1997) Interferon-alpha gene therapy for cancer: retroviral transduction of fibroblasts and particle-mediated transfection of tumor cells are equally effective strategies for gene delivery in murine tumor models. *Gene Therapy* **4**:1053-1060.
68. Merly, F., Huard, C., Asselin, I., Robbins, P. D., and Trembley, J. P. (1998) Anti-inflammatory effect of transforming growth factor- $\beta$  1 in myoblast transplantation. *Transplantation* **65**:793-799.
69. Ghivizzani, S. C., Lechman, E. R., Kang, R., Tio, C., Kolls, J., Evans, C. H., and Robbins, P. D. (1998) Direct adenoviral-mediated gene transfer of IL-1 and TNF-alpha soluble receptors to rabbit knees with experimental arthritis has local and distal anti-arthritic effects. *Proc. Natl. Acad. Sci. USA* **95**:4613-4618
70. Kim, S. H., Yu, S. S., Park, J. S., Robbins, P. D., An, C. S., and Kim, S. (1997) Construction of retroviral vectors with improved safety, gene expression, and versatility. *J. Virol.* **72**:994-1004
71. Seigert, J. and Robbins, P.D. (1999) Rb inhibits the intrinsic kinase activity of the TBP-associated factor TAF<sub>II</sub>250. *Mol. Cell. Biol.* **19**:846-849
72. Gambotto, A., Teuting, T., Kovesdi, I., Tahara, H., Lotze, M. T., and Robbins, P.D. (1999) Effective treatment of established murine colon adenocarcinoma by intratumoral injection of an adenovirus expressing interleukin 12. *Cancer Gene Therapy* **6**:45-53.
73. Nagashima, S., Maillard, R., Kashii, Y., Reichert, T. E., Herberman, R. B., Robbins, P. D., and Whiteside, T. L. (1998) Stable transduction of the IL-2 gene into human natural killer cell lines and their phenotypic and functional characteristics in vitro and in vivo. *Blood* **91**:3850-3861
74. Muller-Ladner, U., Evans, C. H., Franklin, B. N., Roberts, C. R., Gay, R. E., Robbins, P. D., and Gay, S. (1999) Effects of gene transfer of cytokine inhibitors into synovial fibroblasts in the SCID mouse model. *Arth. Rheum.* **42**:490-497.
75. Reinecke, J. A., Wehling, P., Evans, C. H., Robbins, P. D., Sager, M., and Koch, H. Transfer of therapeutic genes to cells of disc, spinal, nerve root, and vertebral bone of the lumbar spine. submitted
76. Osaki, T., Cai, Q., Perron, J.-M., Okamura, H., Robbins, P. D., Kurimoto, M., Lotze, M. T., and Tahara, H. (1999) IFN-gamma-inducing factor/IL-18 administration mediates IFN-gamma and IL-12 independent anti-tumor effects. *J. Immunol.* **160**:1742-1749
77. Hildebrand, K. A., Dele, M., Allen, C. R., Smith, D. W., Georgescu, H. I., Robbins, P. D., Evans, C. H., and Woo, S. L.-Y. (1999) The expression of marker genes in the medial collateral and anterior cruciate ligaments: the use of different viral vectors and the effects of injury. *J. Orth. Res.* **17**:37-42.
78. Whalen, J. D., Lechman, E. R., Carlos, C. A., Weiss, K., Kovesdi, I., Robbins, P. D., and Evans, C. H. (1999) Adenoviral transfer of the viral interleukin 10 gene peri-articularly to mouse paws suppresses development of collagen-induced arthritis in both injected and uninjected paws. *J. Immunol.* **162**:3625-3632.
79. Nishida, K., Kang, J. D., Suh, J.-K., Robbins, P. D., Evans, C. H., and Gilbertson, L. G. (1998) Adenovirus-mediated gene transfer to nucleus pulposus cells: implications for the treatment of intervertebral disc degeneration. *Spine* **23**:2437-2442

80. Qu, Z., Balkir, L., van Deutekom, J. C., Robbins, P. D., Pruchnic, R. and Huard, J. (1998) Development of approaches to improve the cell survival in myoblast transfer therapy. *J. Cell. Biol.* **142**:1257-1267
81. Byun, J., Kim, J.-M., Robbins, P. D., and Kim, S. (1998) The selectable marker neo gene downregulates gene expression from retroviral vectors containing an internal ribosomal entry site. *Gene Therapy* **5**:1441.
82. Lee, W.-C., Zhong, C., Qian, S., Wan, Y., Gauldie, J., Mi, Z., Robbins, P. D., Thomson, A., and Lu, L. (1998) Phenotype, function, and in vivo migration and survival of allogeneic dendritic cell progenitors genetically engineered to express TGF- $\beta$ 1. *Transplantation* **66**:1810-1817
83. Douin-Echinard, V., Robbins, P. D., Lotze, M. T., Gavre, G. and Couderc, B. (1998) Enhancement of anti-tumor immunity by injection of fibroblasts genetically engineered to produce IL-12 and to express CD70. *Adv. Exp. Med. Biol.* **451**:353-357.
84. Adnane, J. and P. D. Robbins. (1999) Cyclin D1 regulates transcription through a direct interaction with TAF<sub>II</sub>250. *Oncogene* **18**:239-248
85. Tueting, T., Gamotto, A., Robbins, P. D., Storkus, W. J. and DeLeo, A. B. (1999) Co-delivery of T helper 1 biasing cytokine genes enhances the efficacy of gene gun immunization of mice: studies with the model tumor antigen  $\beta$ -galactosidase and the BALB/c Meth A P53 tumor specific antigen. *Gene Ther.* **6**:629-636.
86. Nishioka, Y. Robbins, P. D., Lotze, M. T., and Tahara, H. (1999) Induction of systemic and therapeutic anti-tumor immunity using intra-tumoral injection of bone marrow-derived dendritic cells genetically engineered to express interleukin-12 (IL-12). *Cancer Res.* **59**:4035-4041
87. Osaki, T., Hashimoto, W. Gambotto, A., Okamura, H., Robbins, P. D., Kurimoto, M., Lotze, M. T., and Tahara, H. (1999) Potent anti-tumor effects mediated by local expression of the mature form of the interferon-gamma inducing factor, interleukin-18 (IL-18). *Gene Ther.* **6**:808-815.
88. Tueting, T., Gambotto, A., DeLeo, A., Lotze, M. T., Robbins, P. D., and Storkus, W. J. (1998) Induction of tumor antigen-specific immunity using plasmid DNA vaccines in mice. *Cancer Gene Therapy* **6**:73-80.
89. Oyama, M., Tatlock, A., Fukuta, S., Kavalkovich, K., Nishimura, K., Johnstone, B., Robbins, P.D., Evans, C. H., and C. Niyibizi. (1999) Retrovirally transduced bone marrow stromal cells isolated from a mouse model of human osteogenesis imperfecta (oim) persist in bone and retain the ability to form cartilage and bone after extended passaging. *Gene Ther.* **6**:321-329.
90. Baltzer AWA, Whalen JD, Muzzonegro T, Georgescu HI, Robbins PD, Evans CH (1999) In vitro transduction of human osteoblastic cells using retroviral vectors. *Z Rheumatol* **58**: 88-94
91. Baltzer AWA, Lattermann C, Whalen JD, Braunstein S, Robbins PD, Evans CH (1999) A gene therapy approach to accelerating bone healing. Evaluation of gene expression in a New Zealand white rabbit model. *Knee Surg Sports Traumatol Arthrosc* **7**: 197-202
92. Baltzer, A.W.A., Whalen, J.D., Stefanovic-Racic, M., Ziran, B., Robbins, P. D., and Evans, C. H. (1999) Adenoviral transduction of human osteoblastic cell cultures: a new perspective for gene therapy of bone diseases. *Acta Orthopaedica Scandinavia* **70**:419-424.

93. Lu, L., Gambotto, A., Lee, W.-C., Qian, S., Bonham, C. A., Robbins, P. D., and Thomson, A. W. (1999) Adenoviral delivery of CTLA4-Ig into myeloid dendritic cells promotes their in vitro tolerogenicity and survival in allogeneic recipients. *Gene Ther.* **6**:554-563.
94. Lechman, E. R., Jaffurs, D., Ghivizzani, S. C., Gambotto, A., Kovesdi, I., Mi, Z., Evans, C. H. and Robbins, P. D. (1999) Direct adenoviral mediated gene transfer of vIL-10 to rabbit knees with experimental arthritis halts disease progression both locally and systemically. *J. Immunol.* **163**:2202-2208
95. Shuler, F., Georgescu, H., Niyibizi, C., Studer, R. K., Mi, Z., Johnstone, B., Robbins, P. D., and Evans C. H. (2000) Upregulation of matrix synthesis following adenoviral mediated transfer of transforming growth factor  $\beta$ 1 (TGF- $\beta$ 1) cDNA into chondrocytes. *J. Ortho. Res.* **18**:585-592.
96. Esche, C., Gambotto, A., Robbins, P. D., Watkins, S. C., Lotze, M. T., and Shurin, M. R. (1999) CD154 (CD40L) expression inhibits tumor growth in an IL-12-dependent fashion and promotes dendritic cell survival within tumors. *Eur. J. Immun.* **29**:2148-2155.
97. Goto, H., Shuler, F. D., Lamsam, C., Moller, H. D., Robbins, P. D., Niyibizi, C., Fu, F. H., and Evans, C. H. (1999) Gene transfer to meniscus. *J. Bone Joint. Surg.* **81-A**:918-925.
98. Nishida, K., Gilbertson, L. G., Suh, J.-K., Robbins, P. D., Kang, J. D., Moon, S.-H., Voght, M. T., and Evans, C. H. (1999) Modulation of the biological activity of the rabbit intervertebral disc by gene therapy: An in vivo study of adenovirus-mediated transfer of the human TGF- $\beta$ 1 encoding gene. *Spine* **24**:2419-2425
99. Hashimoto, W., Osaki, T., Okamura, H., Robbins, P. D., Kurimoto, M., Nagata, S., Lotze, M. T., and Tahara, H. (1999) Anti-tumor effect associated with the administration of recombinant 18 (rIL-18) protein is mainly exerted by Fas-FasL mediated tumor apoptosis. *J. Immun.* **163**:583-589
100. Giannoukakis, N., Mi, Z., Gambotto, A., Ricordi, C., Trucco, M., and Robbins, P. D. (1999) Comparison of lentiviral and adenoviral gene transfer efficiency to intact human islets of Langerhans *in vitro*. *Gene Ther.* **6**:1545-1551
101. Kubota, T., Bounoutas, G. S., Miyagishima, M., Kadokami, T., Sanders, V. J., Bruton, C., Robbins, P. D., McTiernan, C. F. and A. M. Feldman. (2000) Neutralization of tumor necrosis factor abrogates myocarditis, but not hypertrophy in cytokine-induced cardiomyopathy. *Circulation* **101**:2518-2525.
102. Musgrave, D. S., Bosch, P., Ghivizzani, S. C., Robbins, P. D., Evans, C. H. and J. Huard. (1999) Adenovirus-mediated direct gene therapy with bone morphogenetic protein-2 produces bone. *Bone* **24**:541-547
103. Satoh, Y., Esche, C., Gambotto, A., Shurin, G. V., Yurkovetsky, Z. R., Robbins, P. D., Watkins, S. C., Todo, S., Lotze, M. T., and Shurin, M. R. Local administration of IL-12-transfected dendritic cells induces anti-tumor immune responses to colon adenocarcinoma in the liver in mice. *J. Exp. Ther. Oncol.*, in press
104. Giannoukakis, N., Thomson, A., Bonham, A., Fung, J., Robbins, P. D., and Lu, L. (2000) Prolongation of cardiac allograft survival using dendritic cells treated with NF- $\kappa$ B decoy oligodeoxynucleotides. *Mol. Ther.* **1**:430-437.
105. Howard, M., Jiang, X., Stolz, D., Hill, W. G., Johnson, J., Watkins, S. C., Frizzell, R. A., Bruton, C., Robbins, P. D., and Weisz, O. A. (2000) Forskolin-induced membrane insertion of virally-

- expressed, epitoped-tagged CFTR in polarized Madin-Darby canine kidney cells. *Am. J. Physiol.* **279**:375-382
106. Giannoukakis, N., Rudert, B., Ghivizzani, S. C., Gambotto, A., Ricordi, C., Trucco, M., and Robbins, P. D. (1999) Adenoviral gene transfer of the interleukin-1 receptor antagonist protein to human islets prevents IL-1 $\beta$ -induced  $\beta$  cell impairment and activation of islet cell apoptosis. *Diabetes* **48**:1730-1736
107. Baltzer, A. W. A., Lattermann, C., Weiss, K., Wooley, P., Grimm, M., Ghivizzani, S. C., Robbins, P. D., and Evans, C. H. (2000) Genetic enhancement of fracture repair: Evaluation of Ad-BMP-2 in a lapine femoral defect model. *Gene Ther.* **7**:734-739.
108. Lee CW, Fukushima K, Usas A, Lin X, Pelinkovic D, Martinek V, Somogyi G, Robbins P, Fu F, Huard J. (2000) Biological intervention based on cell and gene therapy to improve muscle healing after laceration. *J. of Musculoskeletal Research* **4**: 265-277
109. Ranieri, E., Herr, W., Gambotto, A., Olson, W., Rowe, D., Robbins, P. D., Kierstead, L. S., Watkins, S. C., Gesualdo, L., and Storkus, W. J. (1999) Dendritic cells transduced with an adenoviral vector encoding for Epstein Barr virus latent membrane protein 2B: a new modality for vaccination. *J. Virol.* **73**:10416-10425
110. Kadokami, T., McTiernan, C. F., Kubota, T., Bounoutas, G. S., Robbins, P. D. and Feldman, A. M. (2001) Effects of soluble tumor necrosis factor receptor treatment on lipopolysaccharide-induced myocardial cytokine treatment. *Am. J. Physiol. Heart Circ. Physiol.* **280**:2281-2291.
111. Oligino, T., Ghivizzani, S. C., Wolfe, D., Lechman, E. R., Krisky, D., Mi, Z., Evans, C. H., Robbins, P. D. and Glorioso, J. C. (1999) Herpes virus viral vector mediated delivery of the IL-1Ra gene to rabbit joints reduces the pathophysiology of IL-1 induced arthritis. *Gene Therapy* **6**:1713-1720.
112. Morelli, A. E., Larregina, A. T., Plowey, J. M., Takayama, T., Loga, A., Robbins, P. D., Falo, L. D., and Thomson, A. W. Recombinant adenoviral vectors induce maturation of murine dendritic cells through activation of the transcription factor NF- $\kappa$ B. *J. Virol.* **74**:9617-9628
113. Baltzer, A. W. A., Lattermann, C., Whalen, J. D., Robbins, P. D. and Evans, C. H. (1999) Viral gene transfer based on Ad-BMP-2 induces bone formation in a rabbit segmental defect model. *Osteosynthese International* **7**:187-197
114. Tueting, T., Steitzl, J., Bruckl, J., Gambotto, A., Steinbrink, K., DeLeo, A. B., Robbins, P. D., Knop, J., and Enk, A. H. (1999) Dendritic cell-based genetic immunization in mice with a recombinant adenovirus encoding murine TRP2 induces effective anti-melanoma immunity. *J. Gene Med.* **1**:400-406
115. Baltzer, A.W. A., Whalen, J. A., Wooley, P., Truchan, L. M., Robbins, P. D., and C. H. Evans. (2001) Prevention of ovariectomy induced bone loss by gene transfer with adenoviral vectors encoding IL-1Ra and sTNF-R in a mouse model. *Gene therapy* **8**:1770-1776
116. Giannoukakis, N., Mi, Z., Rudert, B., Gambotto, A., Ricordi, C., Trucco, M., and Robbins, P. D. (2000) Adenoviral gene transfer of the human insulin-like growth factor-I gene to human islets prevents IL-1 $\beta$ -induced  $\beta$  cell impairment and activation of islet cell apoptosis. *Gene Therapy* **7**:2015-2022
117. Lotze, M. T., Shurin, M., Esche, C., Tahara, H., Storkus, W.J., Kirkwood, J. M., Whiteside, T. L., Elder, E. M., Okada, H., and Robbins, P. (2000) Interleukin-2: developing additional cytokine

- gene therapies using fibroblasts or dendritic cells to enhance tumor immunity. *Cancer J. Sci. Am.* 6:61-66.
118. Musgrave, D. S., Pruchnic, R., Ghivizzani, S. C., Latterman, C., Day, C. S, Robbins, P. D., and Huard, J. (2000) The efficiency of muscle derived cell mediated bone formation. *Cell Transplantation* 9:463-470
119. Okada, H., Pollack, I. E, Lotze, M. T., Lunsford, L. D., Kondziolka, D., Lieberman, E., Schiff, D., Attanucci, J., Edington, H. Chambers, W., Robbins, P., Baar, J., Kinzler, D., Whiteside, T., Elder, E. (2000) Gene therapy of malignant gliomas: a phase I study of IL-4 HSV TK gene modified autologous tumor to elicit an immune response. *Hum. Gene Ther.* 11:637-653.
120. Musgrave, D. S., Pruchnic, R., Wright, V., Bosch, P, Ghivizzani, S. C., Robbins, P. D. and Huard, J. (2001) The effect of bone morphogenetic protein-2 expression on the early fate of skeletal muscle-derived cells. *Bone* 28:499-500
121. Hirao, M., Onai, N., Hiroishi, K., Watkins, S. C., Matsushima, K., Robbins, P. D., Lotze, M. T., and Tahara, H. (2000) The CC chemokine receptor-7 expression on dendritic cells is induced by contact with apoptotic tumor cells and is critically involved in migration from tumor site to the draining lymph nodes in vivo. *Cancer Res.* 60:2209-17.
122. Tahara, H., Elder, E., Zitvogel, L., Storkus, W. J., Robbins, P. D., Cai, Q., Kinzler, D. M., Kirkwood, J., Whiteside, T. and Lotze, M. T. Interleukin 12 (IL-12) gene therapy using direct injection of tumors with genetically engineered autologous fibroblasts. Submitted
123. Tanaka, F., Hashimoto, W., Okamura, H., Robbins, P. D., Lotze, M. T., and Tahara, H. (2000) Rapid generation of potent and tumor-specific cytotoxic T-lymphocytes by interleukin 18 using dendritic cells and natural killer cells. *Cancer Res.* 60:4838-4844
124. Goto, H., Shuler, F. D., Niyibizi, C., Fu, F. H., Mi, Z., Robbins, P. D., and Evans, C. H. (2000) Gene therapy for meniscal injury: enhanced synthesis of proteoglycan and collagen by meniscal cells transduced with a TGF- $\beta$ 1 gene. *Osteoarthritis & Cartilage* 8:266-271
125. Kim, S. H., Ghivizzani, S. C., Oligino, T., Evans, C. H. and Robbins, P. D. (2000) Gene therapy of murine collagen-induced arthritis by local and systemic delivery of IL-4 using adenoviral vectors. *Arthritis Res.* 2:293-302.
126. Iwazawa, T., Chau, G.-Y., Mori, T., Kookeran, K. A., Rubin, J. T., Watkins, S. C., Robbins, P. D., Lotze, M. T. and Tahara, H. (2001) Potent anti-tumor effects of intra-arterial injection of fibroblasts genetically engineered to express IL-12 in a rat liver metastasis model: No additional benefit of using retroviral producer cells. *Cancer Gene Ther.* 8:503-510
127. Siegert, J. L., Rushton, J. J., Seller, W., Kaelin, W. G., and Robbins, P. D. (2000) Cyclin D1 suppresses Rb-mediated inhibition of TAFII250 kinase activity. *Oncogene* 19: 5703-5711
128. Smith, P, Shuler, F. D., Georgescu, H. I., Ghivizzani, S. C., Mi, Z., Johnstone, B., Niyibizi, C., Robbins, P. D. and Evans, C. H. (2000) Genetic enhancement of matrix synthesis by articular chondrocytes: comparison of different growth factor genes in the presence or absence of interleukin 1. *Arth. Rheu.* 43:1156-1164.
129. Okada, H., Pollack, I. F., Lotze, M. T., Lunsford, L. D., Kondziolka, D., Lieberman, F., Schiff, D., Attanucci, J., Edington, H., chambers, W., Robbins, P., Baar, J., Kinzler, D., Whiteside, T. and Elder, E. (2000) Gene therapy of malignant gliomas: a phase I study of IL-4-HSV-Tk gene modified autologous tumor to elicit an immune response. *Hum. Gene Ther.* 11:637-653.

130. Yao, Q., Glorioso, J. C., Kovesdi, I., Evans, C. H., Robbins, P. D., Oligino, T. and Ghivizzani, S. C. (2000) Adenoviral mediated delivery of Fas ligand to Rheumatoid synovium results in extensive apoptosis in the synovial lining. *J. Gene Med.* **2**: 210-219
131. Takayama, T., Morelli, A. E., Robbins, P. D., Tahara, H., and Thomson, A. W. (2000) CTLA4-Ig-transduced myeloid dendritic cells induce Ag-specific T-cell hyporesponsiveness and promote Th2-type responses in vivo. *Gene Ther.* **7**:1265-1273
132. Mi, Z., Ghivizzani, S. C., Lechman, E. R., Jaffurs, D., Glorioso, J. C., Evans, C. H., and Robbins, P. D. (2000) Adenovirus-mediated gene transfer of insulin-like growth factor 1 stimulates proteoglycan synthesis in rabbit joints. *Arth. Rheum.* **43**:2563-2570
133. Moon, S. H., Gilbertson, L. g., Nishida, K., Knaub, M., Mussonigro, T., Robbins, P. D., Evans, C. H., and Kang, J. D., (2000) Human intervertebral disc cells are genetically modifiable by adenovirus gene transfer: Implications for the clinical management of intervertebral disc disease. *Spine* **25**:2573-2579.
134. Wolfe, D., Goins, W. F., Kaplan, T. J., Capuano, S., Murphey-Corb, M., Cohen, J. B., Robbins, P. D., and Glorioso, J. C. (2001) Systemic accumulation of biologically active nerve growth factor following intra-articular herpesvirus gene transfer. *Mol. Ther.* **3**:61-69
135. Brent, S. J., Saxer, R. A., Brower-Toland, B. D., Mi, Z., Robbins, P. D., Evans, C. H. and Nixon, A. J. (2001) Articular insulin-like growth factor-1 therapy via adenoviral mediated gene transfer to the synovial lining. *Hum. Gene Ther.* **12**:117-129
136. Lee, JY, Musgrave, D, Pelinkovic, D, Fukushima, K, Cummins, J, Usas, A, Robbins, P, Fu, FH and Huard, J. (2001) Effect of bone morphogenetic protein-2-expressing muscle-derived cells on healing of critical-sized bone defects in mice. *J. of Bone and Joint Surgery* **83**:1032-9
137. Saxer, R. A., Brower-Toland, B. D., Mi, Z., Robbins, P. D., Evans, C. H. and Nixon, A. J. (2001) Gene mediated insulin-like growth factor-1 delivery to the synovium *J. Orth. Res.* **19**:759-767
138. Lee, J. Y., Qu., Z., Kimura, S., Cao, B., Jankowski, R., Cummins, J., Usas, A., Robbins, P. D., Wernig, A., and J. Huard. (2000) Clonal isolation of muscle derived stem cells capable of enhancing muscle regeneration and improving bone healing. *J. Cell Biol.* **150**:1085-1100
139. Okada, H., Pollack, I. F., Lotze, M. T., Lunsford, L. D., Lieberman, F., Schiff, D., Attanucci, J., Edington, H., Chambers, W., Robbins, P., Kinzler, D., Whiteside, T. and Elder, E. (2000) Gene therapy of malignant gliomas: a phase I study of IL-4-HSV-TK gene modified autologous tumor to elicit an immune response. *Hum. Gene Ther.* **11**:637-653
140. Suzuki, K., Oyama, M., Faulcon, L, Robbins, P. D. and Niyibizi, C. (2000) In vivo expression of human growth hormone by genetically modified murine bone marrow stromal cells and its effect on the cells in vitro. *Cell Transplant.* **9**:319-327
141. Gambotto, A., Dworacki, G., Cicinnati, V., Kenniston, T., Steitz, J., Tueting, T., Robbins, P. D., and DeLeo, A. B. Immunogenicity of enhanced green fluorescent protein (EGFP) in BALB/c mice: Identification of an H2-Kd-restricted CTL epitope. *Gene Ther.* **7**:2036-2040
142. Saleh, A., Srinivasula, S. M., Balkir, L., Alnemri, E. S., and Robbins, P. D. (2000) Negative regulation of the Apaf-1 apoptosome by Hsp70. *Nature Cell Biol.* **2**:476-483.

143. Pirtskhalaishvili, G., Shurin, G. V., Esche, C., Wahl, M., Yurkovetsky, Z. R., Robbins, P. D. and Shuin, M. R. (2000) Transduction of dendritic cells with Bcl-XL increases their resistance to prostate cancer induced apoptosis and antitumor effects in mice. *J. Immunol.* **165**:1956-1964
144. Mi, Z., Mai, J., Lu, X., and Robbins, P. D. (2000) Characterization of a class of cationic peptides able to facilitate efficient transduction in vitro and in vivo. *Mol. Ther.* **2**:339-3467
145. Giannoukakis, N., Rudert, W. A., Trucco, M. and Robbins, P. D. (2000) Protection of human islets from the effects of interleukin 1 $\beta$  by adenoviral gene transfer of an I $\kappa$ B repressor. *J. Biol. Chem.* **275**:36509-36513
146. Kim, S. H., Kim, S., Evans, C. H., Ghivizzani, S. C., Oligino, T., and Robbins, P. D. (2001) Effective treatment of established murine collagen induced arthritis by systemic administration of dendritic cells genetically modified to express IL-4. *J. Immunol.* **66**:259-267
147. Srinivasula, S., Hegde, R., Saleh, A., Datta, P., Shiozaki, E., Chai, J., Lee, R.-A., Robbins, P. D., Fernandes-Alnemri, T., Shi, Y., and Alnemri, E. S. (2001) A conserved XIAP-interaction motif in caspase-9 and Smac/DIABLO regulates caspase activity and apoptosis. *Nature* **410**:112-116
148. Baltzer, A. W. A., Whalen, J. D., Wolley, P., Latterman, C., Truchan, L. M., Robbins, P. D. and Evans, C. H. (2002) Gene therapy for osteoporosis: Evaluation in a murine ovariectomy model. *Gene Therapy* **8**:1770-1776.
149. Sud, S., Nasser, S., Yang, S.-Y., Evans, C. H., Robbins, P. D. and Wooley, P. H. (2001) Effects of cytokine gene therapy on particulate-induced inflammation in the murine air pouch model. *Inflammation* **25**:361-372.
150. Li, Y. Y., Mi, Z., Feng, Y., McTiernan, C. F., Robbins, P. D., Watkins, S. C. and Feldman, A. M. Withdrawal of neonatal rat cardiomyocyte from cell cycle by two forms of ephrin-A5 through the down regulation of cyclin D2 and cdk4. *Amer. J. Phy: Heart Circ. Phys.* **281**:2738-2746.
151. Frisbie, D. D., Ghivizzani, S. C., Robbins, P. D., Evans, C. H., and McIlwraith, C. W. (2002) Treatment of experimental equine osteoarthritis by in vivo delivery of equine interleukin-1 receptor antagonist. *Gene Ther.* **9**:12-20.
152. Kang, W. K., Park, C., Yoon, H. L., Kim, W. S., Yoon, S.-S., Lee, M. H., Park, K., Kim, K., Kim, J. A., Nam, S.-J., Yang, J.-H., Son, Y.-H., Baek, C.H., Han, J., Ree, H. J., Lee, E. S., Kim, D.-W., Ahn, Y. C., Huh, S. J., Choe, Y. H., Lee, J.-H., Park, M. H., Kong, G.-S., Park, E.-Y., Kang, Y.-K., Bang, Y.-J., Paik, N.-S., Lee, S. N., Kim, S.-H., Kim, S., Robbins, P. D., Tahara, H., Lotze, M. T., and Park, C. H. (2001) Interleukin 12 gene therapy of cancer by peritumoral injection of transduced autologous fibroblasts: outcome of a phase I/II study. *Human Gene Ther.* **10**:671-684
153. Del Vecchio, M. A., Georgescu, H. I., Robbins, P. D. and Evans, C. H. (2001) Approaches to enhancing the retroviral transduction of human synoviocytes. *Arthritis Res.* **3**:259-263.
154. Niyibizi, C. Smith, P., Mi, Z., Phillips, C and Robbins, P. D. (2001) Transfer of Col1A2 gene into cells of a murine model of human osteogenesis imperfecta restores synthesis of type I collagen comprised of  $\alpha$ 1(I) and  $\alpha$ 2(I) heterotrimers in vitro and in vivo. *J. Cell Bioch.* **83**:84-91
155. Lu, C., Schwartzbauer, G., Sperling, M. Z., Devaskar, S. U., Thamotharan, S., Robbins, P. D., McTiernan, C. F., Liu, J.-L., Frank, S. J. and Menon, R. K. (2001) Demonstration of direct effects of growth hormone on neonatal cardiomyocytes. *J. Biol. Chem.* **276**:22892-28900

156. Lee, JY, Musgrave, D., Pelinkovic, D., Fukushima, K., Cummins, J., Robbins, P, Fu, F. H., and Huard, J (2001) Effect of bone morphogenetic protein-2-expressing muscle-derived cells on healing of critical sized bone defects in mice. *JBJS* **83**:1032-1039
157. Gruss, C. J., Kapeattu, S., Berking, C., Lininger, J., Nesbit, M., Schaidler, H., Liu, Z.-J., Oka, M., Hsu, M.-Y., Shirkakawa, T., Li, G., Carmeliet, P., El-Diery, W. S., Eck, S. L., Rap, J. S., Baker, A. H., Bennet, J. D., Crombleholme, T. M., Margolis, D. J., Wilson, J. M., Werner, S., Detmar, M., Skobe, M., Robbins, P. D., Johnson, K., Carbone, D., Buck, C., and Herlyn, M. Re-modeling of the human skin architecture in vivo by adenovirus-mediated gene transfer of growth factors, adhesion molecules, proteolytic enzymes, oncogenes, and tumor suppressor genes. *Hum. Gene Ther.*, in press.
158. Yao, Q., Wang, S., Glorioso, J. C., Evans, C. H., Robbins, P. D., Ghivizzani, S. C. and Oligino, T. J. (2001) Gene transfer of p53 to arthritis joints stimulates synovial apoptosis and inhibits inflammation. *Mol. Therapy* **3**:901-910.
159. Whalen, J. D., Thomson, A., D., Lu, L., Robbins, P. D., and Evans, C. H. (2001) Viral IL-10 gene transfer inhibits DTH responses to soluble antigens: Evidence for involvement of genetically modified dendritic cells and macrophages. *Mol. Ther.* **4**:543-550.
160. Berkling, C., Takemoto, R., Schaidler, H., Showe, L., Satyamoorthy, K., Robbins, P. and Herlyn, M. (2001) TGF $\beta$ 1 increases survival of human melanoma through stroma remodeling. *Cancer Res.* **61**:8306-8316
161. Mai, J., Mi, Z., Kim, S. H., and Robbins, P. D. (2001) Effective treatment of established murine tumors by intra-tumoral injection of a pro-apoptotic peptide. *Can. Res.* **61**:7709-7712
162. Alexander, A. M., Crawford, M., Bertera, S., Rudert, W. A., Robbins, P. D., and Trucco, M. (2002) Indoleamine 2,3-Dioxygenase expression in transplanted NOD islets prolongs graft survival after adoptive transfer of diabetogenic splenocytes. *Diabetes* **51**:356-365.
163. Martinek, V., Usas, A., Pelinkovic, D., Robbins, P. Fu, F. and Huard, J. (2002) Genetic engineering of meniscal allografts. *Tissue Eng.* **8**:107-117
164. Martinek V, Lattermann C, Usas A, Abramowitch S, Pelinkovic D, Seil R, Lee J, Robbins P, Fu FH, Woo SL-Y, Huard J. (2002) Enhancement of the tendon-bone integration of ACL tendon grafts with BMP-2 transfer: A histological and biomechanical study. *J. Bone and Joint Surgery*, in press
165. Yao, Q., Wang, S., Gambotto, A., Glorioso, J. C., Evans, C. H., Robbins, P. D., Ghivizzani, S. C., and Oligino, T. J. TRAIL induced apoptosis in the rabbit synovium. *Gene Ther.* In press.
166. Bosch, P, Musgrave, D. S., Shuler, F., Evans, C. H., Robbins, P. D., Moreland, M. S., Fu, F. H., and J. Huard. (2000) Osteoprogenitor cells within skeletal muscle. *J. Orth. Res.* **18**:933-944
167. Lattermann, C., Baltzer, A. W. A., Whalen, J. D., Gruen, G. S., Robbins, P. D., and Evans, C. H. (2001) Gene transfer to the site of an experimental atrophic non-union established in the rabbit tibia. *J. Orth. Trauma.*, in press
168. Lee, JY, Peng, H, Usas, A, Musgrave, D, Cummins, J, Pelinkovic, D, Ziran, B, Robbins, P and Huard, J. (2002) Enhancement of Bone Healing on Ex vivo Gene Therapy using Human Muscle-Derived Cells. *Human Gene Therapy* **13**:1201-1211



169. Lee C W, Martinek V, Usas A, Musgrave D, Pickvance E, Robbins P, Moreland M, Fu FH, and Huard J (2002) Muscle-based Gene Therapy and Tissue Engineering for the Treatment of Growth Plate Injuries. *J of Pediatrics Orthopaedic* **22**:565-572
170. Ma, A., Mi, Z., Wilson, A., Alber, S., Robbins, P. D., Watkins, S., Pitt, B., and Li, S. (2002) Redirecting adenovirus to pulmonary endothelium by cationic liposomes. *Gene therapy* **9**:176-182
171. Ma, L., Kim, S.-H., Rudert, W. A., Wright, M., Machen, J., Lakomy, R., Qian, S., Lu, L., Robbins, P. D., Trucco, M., and Giannoukakis, N. Immunosuppressive effects of glucosamine. *J. Biol. Chem.*, in press
172. Yang, S., Wu, B., Mayton, L, Evans, C. H., Robbins, P. D. and Wooley, P. H. (2002) IL-1Ra and vIL-10 gene transfer using retroviral vectors ameliorates particle-associated inflammation in the murine air pouch model. *Inflamm. Res.* **51**:342-350
173. Watkins, S., Geng, X., Li, L., Papworth, G., Robbins, P. D. and Drain, P. (2002) Imaging secretory vesicles by fluorescent protein insertion in propeptide rather than mature secreted peptide. *Traffic* **3**:149-173
174. Kim, S. H. Lechman, E. R., Kim, S., Nash, J., Oligino T., J., and Robbins, P. D. Intra-articular, ex vivo delivery of the IL-1 receptor antagonist and soluble TNF-alpha receptor confers a therapeutic effect in both the treated and untreated contralateral joints in a rabbit antigen-induced arthritis model. *Mol. Therapy*, in press.
175. Bonham, C. A., Peng, L., Liang, X., Chen, Z., Wang, L., Ma, L., Hackstein, H., Robbins, P. D., Thomson, A. W., Fung, J. J., Qian, S., and Lu, L. (2002) Marked prolongation of cardiac allograft survival by dendritic cells genetically engineered with NF-kB oligodeoxynucleotide decoys and adenoviral vectors encoding CTLA4-Ig. *J. Immunol.*, In press.
176. Kim, S. H., Kim, S., Oligino, T. J. and Robbins, P. D. Effective treatment of established murine collagen induced arthritis by systemic administration of dendritic cells genetically modified to express FasL. *Mol. Therapy*, in press
177. Mi, Z., Ghivizzani, S. C., Lechman, E. R., Glorioso, J. C., Evans, C. H. and Robbins, P. D. Intra-articular effects of TGF- $\beta$ 1 following adenoviral-mediated gene delivery. *Arthritis Res.*, under revision
178. Miki, T., Stella, A., Gao, W.-T., Robbins, P. D., Valdivia, L. A. and Gambotto, A. Cloning and expression of a cDNA encoding rat indoleamine 2,3-Dioxygenase. Submitted.
179. Bertera, S., Crawford, M., Alexander, A., Watkins, S. C., Robbins, P. D., and Trucco, M. Gene transfer of manganese superoxide prolongs transplanted islet function in an autimmune mouse model of diabetes. *Diabetes*, under revision.
180. Numasaki, M., Hirao, M., Furumoto, H., Robbins, P. D., Lotze, M. T., and Tahara, H. CD40 ligand expression by tumor cells elicits potent, specific and long-lasting anti-tumor immunity: IL-12 dependent and IFN-gamma independent mechanism and in cooperation with GM-CSF and IL-12. Submitted
181. Jaffurs, D., Lechman, E. R., Georgescu, H. I., Robbins, P. D., and Evans, C. H. Effects of adenoviral-mediated transfer of the human iNOS gene upon the behavior of rabbit articular chondrocytes *in vitro*. Submitted.

182. Blumberg, D., Epperly, M., Jefferson, M., Liu, K., Cook, T., Chung, J., Kibbe, M., Finkelstein, S., Vodovotz, Y., Zamora, R., Robbins, P. D., Kovesdi, I., Greenberger, J., and Billiar, T. Gene therapy with the human inducible nitric oxide synthase sensitizes human cancer cells to radiation. Submitted
183. Hirao, M. Nishioka, Y., Watkins, S. C., Robbins, P. D., Lotze, M. T., and Tahara, H. Tumor specific cellular immune response induced with intra-tumoral injection of immature dendritic cells. Submitted.
184. Evans, C. H., Robbins, P. D., Ghivizzani, S. C., Wasko, M. C., Tomaino, M. X., Kang, R. C., Muzzupigro, T. A., Voight, M., Elder, E. M., Whiteside, T. L., Watkins, S. C., and Herndon, J. H. Gene transfer to human joints: Progress towards a gene therapy of arthritis. Submitted.
185. Uchibayashi, N., Robbins, P. D., Lotze, M. T., and Tahara, H. Immature dendritic cells capturing exogenous antigen, generated ex vivo quantitatively from CD34+ blood progenitors cultured with GM-CSF and Flt-3 ligand. Submitted.
186. Hasimoto, W., Tanaka, F., Robbins, P. D., Taniguchi, M., Okamura, H., Lotze, M. T. and Tahara, H. (2001) NK but not NKT cells play a necessary role to promote an acute anti-tumor response induced by IL-18. Submitted.
187. Tanaka, F., Hashimoto 18., W., Robbins, P. D., Lotze, M. T., and Tahara, H. Therapeutic and specific anti-tumor immunity induced by co-administration of immature dendritic cells and adenoviral vector expressing biologically active IL-18. *Gene Therapy*, in press.
188. Neumann, E., Judex, M., Kullman, F., Grifka, J., Robbins, P. D., Pap, T., Evans, C. H., Gay, S., Schomerich, J., and Mueller-Ladner, U. Complete inhibition of cartilage destruction by double gene transfer of IL-1Ra and IL-10 is mediated by the activin pathway. *Gene Ther.*, in press.
189. Gao, W., Kumar, S., Lotze, M. T., Hanning, C., Robbins, P. D. and Gambotto, A. Innate immunity mediated by the interleukin-1 homologue 4 (IL-1H4/IL-1F7) proinflammatory cytokine induces IL-12 dependent adaptive and profound anti-tumor immunity. *J. Immunol.*, under revision
190. Lechman, E. R., Karavala, A., Nash, J., Kim, S. H., Mi, Z., and Robbins, P. D. The contralateral effect conferred by intra-articular adenovirus mediated gene transfer of vIL-10 is antigen specific. Gene therapy, under revision.
191. Rheman, K. K., Bertera, S., Bottino, R., Mai, J., Mi, Z., Trucco, M. and Robbins, P. D. Protection of islets by in situ peptide mediated transduction of the I $\kappa$ B kinase (IKK) inhibitor Nemo binding domain (NBD) peptide. *J. Biol. Chem.*, in press.
192. Witham, T. F., Villa, L., Bozik, M. E., Attanucci, J., Pollack, I. F., Robbins, P. D., Okada, H., and Chambers, W. H. Expression of a soluble transforming growth factor- $\beta$  (TGF- $\beta$ ) receptor reduces tumorigenicity by regulating natural killer (NK) cell activity against 9L gliosarcoma in vivo. Submitted.
193. Latterman, C., Menetry, J., Clatworthy, M., Robbins, P. D., Niyibizi, C., Evans, C. H. and Fu, F. H. Gene transfer to the bone-tendon insertion site. Submitted.
194. Tasumi, T., Gambotto, A., Robbins, P. D., and Storkus, W. J. Interleukin 18-gene transfer expands the repertoire of Th1-type immunity elicited by dendritic cell-based vaccines in association with enhanced efficacy. *Cancer Res.*, in press.

195. Tourkova, I. L., Yurkovestsky, Z. R., Gambotto, A., Makerenkova, V. P. , Perez, L., Balkir, L., Robbins, P. D., Shurin, M. R. and Shurin, G. V. Increased function and survival of IL-15-transduced human dendritic cells are mediated by up-regulation of IL-15R alpha and Bcl-2. *J Leukoc Biol.*, in press.
196. Mukherjee, P., Wu, B., Robbins, P. D., and Wooley, P. H., Tumor necrosis factor receptor gene therapy causes a TH1 to TH2 shift in collagen induced arthritis. Submitted
197. Mai, J. C., Shen, H., Watkins, S. C., Cheng, T., and Robbins, P. D. (2002) Efficiency of Protein Transduction Is Cell Type-Dependent and Is Enhanced by Dextran Sulfate. *J. Biol. Chem.*, in press
198. Ma, L., Qian, S., Liang, X., Wang, L., Woodward, J. E., Giannoukakis, N., Robbins, P. D., Bertera, S., Trucco, M., Fung, J. J. and Lu, L. Prevention of Diabetes in NOD mice by systemic administration of dendritic cells deficient in NF-kB DNA binding function. Submitted.
199. Kaneko, K., Wang, Z., Kim, S. H., Morelli, A. D., Robbins, P. D. and Thomson, A W.. (2002) Dendritic cells genetically engineered to express IL-4 exhibit enhanced IL-12p70 production in response to CD40 ligation and enhance organ allograft rejection. *Gene Therapy*, in press
200. Numasaki, M., Robbins, P. D., Lotze, M. T., Tahara, H and Kudo, T (2002) Interleukin-17 promotes angiogenesis. Submitted.
201. Feili-Hariri, M., Falkner, D. H., Gambotto, A., Papworth, G. D., Watkins, S. C., Robbins, P. D. and Morel, P. A. Adenoviral IL-4-transduced DC therapy inhibits diabetes developoment in NOD mice with established arthritis. *Human Gene Ther.*, under revision.
202. Kitagawa, T., Iwazawa, T., Robbins, P. D., Lotze, M. T., and Tahara, H. Advantages and limitations of particle-mediated transfection (gene gun) in cancer immuno-gene therapy using IL-10, IL-12 or B7-1 in murine tumor models. Submitted
203. Yurkovetsky, Z. R., Gambotto, A., Shurin, M. R., Kim, S. H., and P.D. Robbins (2002) Intra-tumoral administration of Ad-CD40L or DC-CD40L elicited effective anti-tumor immunity in mice. submitted
204. Mi, Z., Lu, X., Mai, J. C., Ng, B., Lechman, E. R., Watkins, S. C., Wang, G., Rabinowich, H., and Robbins, P. D. Peptide mediated Induction of Apoptosis of Hyperplastic Synovium for the Treatment of Rheumatoid Arthritis. Submitted
205. Mahidharra, R. S., Kohout, J., Beer, D. G., Lin, J., Watkins, S. C., Robbins, P. D., Billiar, T. r., and Hughes, S. J. In esophageal adenocarcinoma, altered trafficking of Fas and subsequent resistance to Fas-mediated apoptosis occurs by a wild-type p53 independent mechanism. Submitted.
206. Geng, X., Li, L., Robbins, P.D., and Drain, P. 2002. The Glucose-Regulated Pancreatic KATP Channel Is Targeted to the Insulin Secretory Granule. Submitted.
207. Gao, W., Robbins, P. D., and Gambotto, A. Nucleotide sequence of human adenovirus type 35: genome structure analysis and generation of E3 deleted recombinant virus. Submitted.
208. Gao, W., Rzewski, A., Robbins, P. D., and Gambotto, A. Combination of DNA optimization and algorithm and gene assembly for SIV/HIV sequences. Submitted.
209. Wang, S., Tatake, R., Glorioso, J. C., Barton R., Robbins, P. D., and Oligino, T. J. Adenoviral mediated delivery of activated caspase and granzyme B molecules induces apoptosis of arthritic synovium both in vitro and in vivo. In preparation.

## Reviews, Book Chapters, and Invited Papers

1. Robbins, P. and M. Botchan. (1985) Promoter specificity of the SV40 enhancer: activation by T antigen. in *Eukaryotic Transcription: the role of cis and trans-acting factors in initiation*, Y. Gluzman, ed., CSHL
2. Robbins, P. and M. Botchan. (1985) Trans-activation of the SV40 enhancer and late promoter by T-antigen. in *Transcription Regulatory Factors*, L. Gold and R. Calendar, ed.
3. Robbins, P.D. (1988) Advances in gene transfer and gene therapy. *Trends Biotech.* 6:80-83.
4. Bandara, G., Robbins, P.D., Georgescu, H.I., Glorioso, J.C., and Evans, C.H. (1992) Gene transfer to synoviocytes: Prospects for gene treatment for arthritis. *DNA Cell. Biol.* 11:227-231.
5. Evans, C. H., Bandara, G., Robbins, P.D., Mueller, G., and J. C. Glorioso. (1993) The future of gene therapy and rheumatic diseases. in *The Molecular Basis of Medicine*. Eds. C. V. Chang and A. M. Feldman, Mosby-Year Book, Inc. in press.
6. Evans, C. H., Bandara, G., Robbins, P.D., Mueller, G., Georgescu, H. I., and J. C. Glorioso. (1993) Gene Therapy for Ligament Healing. in *Anterior Crucia Ligament - Current and Future Concepts*. Eds. S. Arnoczky, S.L.Y. Woo, C. B. Frank, and D. W. Jackson. Raven Press. pgs. 419-422.
7. Evans, C. H., Bandara, G., Mueller, G., Robbins, P.D., Glorioso, J.C. and H. I. Georgescu. (1992) Synovial cell transplants for gene transfer to joints. *Transplantation Proceedings* 24:2966.
8. Tahara, H., Mueller, G., Robbins, P.D., and Lotze, M.T. (1992) Islets cell transplantation facilitated by gene transfer. *Transplantation Proceedings* 24:2975-2976.
9. Bahnson, A., Nimgaonkar, M., Boggs, S. S., Robbins, P. D., Patrene, K., Fei, Y., Li, J., Ball, T., and J. A. Barranger (1993) Transduction and expression of the human glucocerebrosidase gene in the long term murine model and in rhesus monkey bone marrow and human CD34 cells. *Proc. of the Sixth International Symposium on Autologous Bone Marrow Transplantation*, pgs. 138-144, K. Dickie and A. Keating, Eds. Baylor College of Medicine Press.
10. Evans, C. H. and P. D. Robbins. (1994) Gene therapy for arthritis in *Gene Therapeutics: Methods and Applications of Direct Gene Transfer* ed. J. A. Wolff, Birkhauser press, Boston, pgs 320-343.
11. Sakai, T., Ohtani-Fujita, N., McGee, T. L., Fujita, T., Aoike, A., Osifchin, N., Robbins, P.D., and T. P. Dryja. Inactivation of promoter activity of the retinoblastoma gene by genetic or epigenetic change. *Cancer Prevention and Detection*, in the press
12. Evans, C. H. and P. D. Robbins (1994) The interleukin-1 receptor antagonist and its delivery by gene transfer. *Receptor* 4:9-15.
13. Robbins, P. D., Tahara, H., Mueller, G. M., Hung, G., Bahnson, A., Zitvogel, L., Galea-Lauri, J., Ohashi, T., Patrene, K., Boggs, S. S., Evans, C. H., Barranger, J. A., and M. T. Lotze. (1993) Retroviral vectors for use in human gene therapy for cancer, Gaucher disease, and arthritis, in *Gene Therapy for Neoplastic Diseases, Annals of the New York Academy of Sciences*, vol. 716, pgs. 72-89.
14. Evans, C. H. and P. D. Robbins (1994) Gene Therapy for Arthritis. *J. Rheumat.* 21:779-782.

15. Robbins, P. D. and H. Tahara (1995) The role of direct alteration of the genome. *Human In Vitro Organogenesis*, ed. P. C. Johnson, CRC press, in press.
16. Hung, G., Robbins, P. D., and C. H. Evans (1994) Synovial Cell Transplantation in *Cell Transplantation*, J. C. Glorioso, Ed., R. G. Landes, Austin TX, pgs. 222-234.
17. Pappo, I., Tahara, H., Robbins, P.D., Gately, M. K., Wolf, S. F., Barnea, A., and M. T. Lotze (1995) Administration of systemic or local interleukin 2 enhances the antitumor effects of interleukin 12 gene therapy. *J. Surg. Res.* 58:218-226
18. Evans, C. H. and P. D. Robbins (1995) Gene Therapy for Arthritis, in *Molecular and Cell Biology of Human Disease*, G. Dickson, Ed., Chapman and Hall., pgs. 252-261
19. Robbins, P. D., and C. H. Evans (1994) Gene Therapy for Arthritis. *ILAR News* 34:53-56.
20. Evans, C. H. and P. D. Robbins (1995) Gene Therapy as a Treatment for Arthritis, *Expert Opinion on Investigational Drugs* 4:843-852.
21. Ghivizzani, S. C., Ohtani, K., Robbins, P. D., and C. H. Evans (1998) Gene therapy for intraarticular pathology. in *Gene Therapy*, S. Grisolia, ed., Fundacion BBV, Bilbao, pgs. 527-538.
22. Barranger, J. A., Bahnson, A. B., Nimgaonkar, M. D., Ball, E. D., Robbins, P. D., Boggs, S. S., and T. Ohashi (1995) Gene therapy for genetic disease. *International Pediatrics* 10:5-9.
23. Evans, C. H. and Robbins, P. D. (1995) Possible orthopaedic applications of gene therapy. *J. Joint Bone Surgery* 77A:1103-1114
24. Evans, C. H. and Robbins, P. D. (1995) Progress towards the treatment of arthritis by gene transfer. *Annals of Medicine* 27:543-546.
25. Evans, C. H. and Robbins, P. D. (1995) Gene therapy in rheumatic disease in *Proceedings of the Association of American Physicians* 108:1-5
26. Ghivizzani, S. Kang, R., Evans, C. H., and Robbins, P (1996) Gene therapy for arthritis. in *Concepts in Gene Therapy*, M. Strauss and J. A. Barranger, Eds., Walter de Gruyter, Berlin, pgs. 417-430
27. Robbins, P. D. and Evans, C. H. (1996) Potential for treating autoimmune diseases by gene therapy. *Gene Therapy* 3:187-189
28. Evans, C. H. and Robbins, P. D. (1996) Patenting gene therapy for arthritis. *Expert Opinion on Therapeutic Patents* 6:253-257
29. Robbins, P. D., Shao, Z, Adnane, J. and J. E. Siegert (1995) Transcriptional regulation by the retinoblastoma tumor suppressor gene. *Molecules and Cells* 5:529-538.
30. Kang, R., Robbins, P. D., and C. H. Evans (1996) Methods for gene transfer to synovium. in *Gene Therapy Protocols*, Humana Press, Inc., Totowa, N. J., Robbins, P. D., ed., pgs. 357-368.
31. Robbins, P. D. and J. A. Horowitz (1997) Transcriptional regulation by the retinoblastoma tumor suppressor. *Progress in Nucleic Acids Research and Molecular Biology*. in press

32. Zitvogel, L., Couderc., B., Mayordoma, J. I., Robbins, P. D., Lotze, M. T., and W. J. Storkus. (1996) IL-12-engineered dendritic cells serve as effective tumor vaccine adjuvants *in vivo*. *Annals of the New York Academy of Sciences* **795**:284-293
33. Tahara, H., Zitvogel, L., Storkus, W. J., Robbins, P. D., and M. T. Lotze (1996) Murine models of cancer cytokine gene therapy using IL-12. *Annals of the New York Academy of Sciences* **795**:275-283
34. Lotze, M. T., Zitvogel, L., Cambell, R. Robbins, P. D., Elder, E., Haluszczak, C., Martin, D., Whiteside, T. L., Storkus, W. J., and H. Tahara. (1996) Cytokine gene therapy of cancer using interleukin-12: murine and clinical models. *Annals of the New York Academy of Sciences* **795**:440-454
35. Pitt. B. and P. D. Robbins. (1996) Fetal Gene Therapy: Retrovirus-mediated gene therapy to fetal lung. *Molecular Human Reproduction* **2**:467-474.
36. Evans, C. H. and P. D. Robbins (1996) Pathways to gene therapy in rheumatoid arthritis, *Curr. Opin. Rheum.* **8**:230-234
37. Robbins, P. D. and S. C. Ghivizzani (1997) Viral vectors for gene therapy. *Pharmacology and Therapeutics* **80**:35-47.
38. Robbins, P. D., Ghivizzani, S. C., and Evans, C. H. (1997) Gene transfer to joints, *Drug News and Perspectives* **10**:283-292.
39. Glorioso, J. C., Robbins, P. D., Krisky, D., Marconi, P., Goins, W. F., Schmidt, M. C., and C. H. Evans. (1997) Progress in the development of herpes simplex viurs gene vectors for treatment of rheumatoid arthritis. in *Advanced Drug Delivery Reviews*, B. Davidson, ed., Vol. 27:41-57
40. Robbins, P. D. (1996) Current status and future prospects of gene therapy. *Korean BioForum* **4**:37-46.
41. Evans, C. H., Whalen, J., and Robbins, P. D. (1997) Gene therapy for inflammatory diseases. in *Textbook on Immunopharmacology*. F. P. Nijkamp, ed.,
42. Kang, R., Ghivizzani, S. C., Herndon, J. H., Robbins, P. D., and Evans, C. H. (1997) Gene therapy for arthritis: Principles and Practice. *Biochemical Society Transactions* **25**:533-537
43. Robbins, P. D., Ghivizzani, S. C., Kang, R., Jaffer, D. C., and Evans, C. H. (1997) Development of a gene therapy for arthritis. in *Interdisciplinary Approaches to Gene Therapy: Legal, ethical and scintific aspects*; Mueller, St., Simon, J., and Vesting, J., eds.; Springer Verlag, Heidelberg. pages 41-50
44. Evans, C. H, Ghivizzani, S. C., Kang, R., Herndon, J. H., and Robbins, P. D. (1997) Progress towards arthritis gene therapies. *Rheumatoid Arthritis – ID Research Alert* **1**:241-245.
45. Evans, C. H. and Robbins, P. D. (1995) Possible orthopaedic applications of gene therapy. *J. Joint Bone Surgery* **77A**:1103-1114
46. Gerich, T.G., Fu, F.H., Robbins, P.D., and Evans, C. H. (1996) Prospects for gene therapy in sports medicine. *J. Eur. Soc. Knee Surg.* **4**:180-187
47. Evans, C. H. and Robbins, P.D. (1997) Gene Therapy for Arthritis (Update). *Expert Opinion of Investigational Drugs*. **10**:837-840.

48. Evans, C. H., Ghivizzani, S. C., Kang, R., Muzzonigro, T., Wasko, M. C., Herndon, J. H. and Robbins, P. D. (1997) Gene Therapy in Rheumatic Diseases, *Arthritis Rheum.*, in press
49. Kang, R., Ghivizzani, S. C., Fu, F., Robbins, P. D., and Evans, C. H. (1997) Progress toward the development of gene therapy for use in orthopaedic sports medicine. *Osterreichisches Journal fur Sportmedizin* 27:11-29
50. Latterman, C., Robbins, P. D., Evans, C. H. and Fu, F. H. (1997) Gene Therapy in Sports Medicine. In: Sports and Children, K.-M. Chan and L. J. Micheli, eds), pp. 210-216, Williams and Wilkins, Hong Kong, 1998.
51. Robbins, P. D., Ghivizzani, S. C., Lechman, E. R., Muzzinegro, T. and Evans, C. H. (1998) Clinical application of retroviral vectors for Gene Therapy of Arthritis. in *Cancer Gene Therapy*, IBC Library Series, pgs. 327-340.
52. Evans, C. H. and Robbins, P. D. (1997) Getting genes into human synovium (editorial). *J. Rheum.* 24:2061-2063
53. Evans, C. H., Ghivizzani, S. C., Whalen, J. D., and Robbins, P. D. (1998) Gene therapy in autoimmune diseases. *Ann. Rheumatic Diseases* 57:125-127
54. Niyibizi, C. Baltzer, A. Latterman, C., Oyama, M., Whalen, J. D., Robbins, P. D., and Evans, C. H. (1998) Potential role for gene therapy in the augmentation of fracture healing. *Clin. Orthop.* 355:S148-53
55. Lansam, C., Fu, F. H., Robbins, P. D., and Evans, C. H. (1997) Gene therapy in sports medicine. *Sports Med.* 25:73-77
56. Gerich, T. G., Lobenhoffer, H. P., Fu, F. H., Robbins, P. D., and Evans, C. H (1997) Virally mediated gene transfer in the patellar tendon: An experimental study in rabbits. *Unfallchirurg* 100:354-362. in German
57. Gerich, T. G., Lobenhoffer, P., Fu, F. H., Robbins, P. D., and Evans, C. H. (1997) Possibilities of gene therapy in traumatic and degenerative articular lesions: Current status of experimental and initial clinical applications. *Orthopade* 26:450-458. in German
58. Gerich, T. G., Ghivizzani, S. C., Fu, F. H., Robbins, P. D., and Evans, C. H. (1997) Gene transfer into the patellar tendon of rabbits: a preliminary study of locoregional expression of growth factors. *Wien Klin Wochenschr* 109:384-389, in German
59. Reinecke, J. A., Wheling, P., Robbins, P. D., Evans, C. H., Sager, M., Schulze-Allen, G. and Koch, H. (1997) In vitro transfer von genen in spinale geivebe. *Zeitschrift fur Orthopaedie* 135:412-416
60. Robbins, P. D. and Evans, C. H (1998) Gene therapy for arthritis. *Science & Med.* 5:6-7
61. Robbins, P. D., Evans, C. H., and Chernajovsky, Y. (1998) Gene therapy for rheumatoid arthritis. *Springer Seminars in Immunopathology* 20:197-209.
62. Evans, C. H. and Robbins, P. D. (1997) Gene therapy in rheumatic diseases. in *Fast Facts - Rheumatology Highlights 1997*, P.Emery, ed., Health Press Limited, Oxford, UK., pgs. 81-87.

63. Latterman, C., Robbins, P. D., Evans, C. H. and Fu, F. (1998) Gene therapy in sports medicine. In: Sports and Children, Chan, K.-M. and Micheli, L. J., eds, Williams and Wilkins, Hong Kong, pgs. 210-216.
64. Evans, C. H., Ghivizzani S. C., and Robbins, P. D. (1998) Blocking cytokines with genes. *J. Leuk. Biol.* **64**:55-61.
65. Giannoukakis, N., Thomson, A. W., and Robbins, P. D. (1999) Gene therapy in transplantation. *Gene Ther.* **6**:1499-1511
66. Evans, C. H. and Robbins, P. D. Will there be a role for gene therapy? In: Questions and Uncertainties in Rheumatoid Arthritis. H. A. Bird and M. L. Smith, eds, Blackwell Sciences, Oxford, UK, In Press.
67. Moller, H. D., Evans, C. H., Robbins, P. D., and Fu, F. H. (1998) Gene therapy in orthopedic sports medicine. In: Controversies in Orthopedic Sports Medicine. Chan, K. M., Fu, F., Maffulli, N., Rolf, C., Kruosaka, M., and Liu, S., eds. Williams & Wilkens, pgs. 577-588.
68. Evans, C. H. and Robbins, P. D. (1995) Possible orthopaedic applications of gene therapy. *J. Joint Bone Surgery* **77A**:1103-1114
69. Robbins, P. D. (1999) Retroviral Vectors in *Gene Therapy: Principles and Applications*, T. Blankenstein and Herrmann, Eds., Chapman and Hall, pgs. 13-28
70. Latterman, C., Baltzer, A. W. A., Whalen, J. D., Evans, C. H., Evans, C. H., Robbins, P. D. and Fu, F. H. (1998) Gene therapy in sports medicine in *Sports Medicine and Arthroscopy Review* **6**:83-88.
71. Ghivizzani, S. C., Mi, Z., Lechman, E. R., Jaffurs, D., Evans, C. H. and Robbins, P. D. (2000) Animal models of arthritis using gene transfer in *Gene Therapy for Inflammatory Diseases*, Evans, C. H., and Robbins, P. D., Eds., Birkhauser, Bonn Germany, pgs. 241-254
72. Evans, C. H. and Robbins, P. D. (2000). Gene therapy for inflammatory diseases: Basic concepts in *Gene Therapy for Inflammatory Diseases*, Evans, C. H., and Robbins, P. D., Eds., Birkhauser, Bonn Germany, pgs. 1-12
73. Whalen, J. D. Robbins, P. D. and Evans, C. H. (1998) Gene therapy in arthritis. *Curr. Res. Mol. Therap.* **1**:690-694.
74. Muzzonigro, T. S., Ghivizzani, S. C., Robbins, P. D., and C. H. Evans (1999) The role of Gene Therapy, Fact or Fiction? *Clinics Sports Med.* **18**:223-239
75. Lu, L., Takayama, T., Lee, W.-C, Qian, S. Gambotto, A., Robbins, P. D., and A. W. Thomson. (1999) Genetic engineering of dendritic cells to express immunosuppressive molecules. *J. Leuk. Biol.* **66**:293-296
76. Studer, R., Jaffurs, D., Stefanovic-Racic, M., Robbins, P. D. and Evans, C. H. (1999) Nitric oxide in osteoarthritis. *Osteoarthritis and Cartilage* **7**:377-379
77. Evans, C. H. and Robbins, P. D. (1999) Potential treatment of osteoarthritis by gene therapy. *Rheum. Clin. N. America*, in press



78. Koch, H., Baltzer, A. W. A, Liebau, C., Evans, C. H., Robbins, P. D., Merk, H., and Krauspe, R. (2000) Optionen fur den einsatz einer gentherapie zur behandlung von knochentumoren. *Osteologie* **9**:200-205
79. Herndon, J., Robbins, P. D. and Evans, C. H. (1999) Gene therapy for orthopaedic applications – a status report. *J. Bone Joint Surg.* **81**:152-157
80. Evans, C. H. and Robbins, P. D. (1999) Gene Therapy of Arthritis. *Internal Medicine* **38**:233-239.
81. Bertera, S., Alexander, A., Giannoukakis, N., Robbins, P. D. and Trucco, M. (1999) Immunology of type I diabetes: Intervention/prevention strategies. In *Endocrinology and Metabolism: Clinics of North America*. S. Arslanian, ed., William B. Saunders Press, Vol. **28**, pgs. 841-864.
82. Giannoukakis, N., Trucco, M and Robbins, P. D. (1999) Gene therapy for type I diabetes mellitus. In *Gene Therapy for Inflammatory Diseases*, Evans, C. H. and P. D. Robbins, eds., Birhkauser, Bonn Germany, pgs. 133-162
83. Gambotto, A., Kim, S. H., Kim, S., and Robbins, P.D. (1999) Methods for constructing and producing retroviral vectors. In *Developmental Biology Protocols*, R. S. Tuan and C. W. Lo, eds. Human Press, Inc., Totowa, N. J.
84. Evans, C. H., Rediske, J., Abramson, S. and Robbins, P. D (1999) The first international meeting on the gene therapy of arthritis and related disorders – Meeting Summary. *Molecular Medicine Today* **5**:148-151
85. Lechman, E. R., Mi, Z., Ghivizzani, S. C., Evans, C. H., and Robbins, P. D. (1999) Transplantation of synovial cells. *Graft* **2**:154-157
86. Kim, S. H., Kim S., and Robbins, P. D. (2000) Retroviral vectors. *Adv. Virus. Res.* **55**:545-563
87. Robbins, P. D., Ghivizzani, S. C., Glorioso, J. C., and Evans, C. H. (2000) Vectors for gene transfer to joints. In *Gene Therapy in Orthopedic and Sports Medicine*, J. Huard and F. H. Fu, eds., Birkhauser Boston and Springer-Verlag New York, Inc., pgs.245-259
88. Evans, C. H., Ghivizzani, S. C., Lechman, E. R., Mi, Z., Jaffurs, D. and Robbins, P. D. (1999) Lessons learned from gene transfer approaches. *Arthritis Res.*, in press <http://arthritis-research.com/vol1no1/08jul99/review/1> (review article published online)
89. Giannoukakis, N., Rudert, W. A., Robbins, P. D., and Trucco, M. (1999) Targeting autoimmune diabetes with gene therapy. *Diabetes* **48**:2107-2121.
90. Ghivizzani SC, Oligino T, Robbins PD and CH Evans. (2000) Cartilage injury and repair. *Phys. Med. Rehabil. Clin. N. Am.* **11**:289-307
91. Evans, C. H., Ghivizzani, S. C., and Robbins, P. D. (2000) Potential applications of gene therapy in sports medicine. . *Phys. Med. Rehabil. Clin. N. Am.* **11**:405-416
92. Lodino, A. V., Rothman, D., Robbins, P. D., and Evans, C. H. (2000) Gene therapy for JRA? *J. Rheum.***27**:53-55.
93. Kang, R., Ghivizzani, S. C., Muzzonigro, T. S., Herndon, J. H., Robbins, P. D., and Evans, C. H. (2000) Orthopaedic applications of gene therapy – from concept to clinic. *Clinical Orthopaedics and Related Research* **374**.

94. Gambotto, A, Cincinnati, V. and Robbins, P. D. (2000) Genetic approaches for the biological therapy of cancer. *Advances in Drug Research*, in press.
95. Moller, H. D., Fu, F. H., Niyibizi, C., Studer, R., Georgescu, H. J., Robbins, P. D., and Evans, C. H. (2000) *Orthopade* 29:75-79. (in German)
96. Nixon, A. J., Tower-Toland, B. D., Bent, S. J., Saxer, B. S., Wilke, M. J., Robbins, P. D. and Evans, C. H. (2000) Insulin-like growth factor-1 gene therapy applications in cartilage repair and degenerative joint disease. *Clin. Ortho.* **379**:201-213
97. Ghivizzani, S. C., Oligino, T. J., Glorioso, J. C., Robbins, P. D., and Evans, C. H. (2000) Gene therapy approaches for treating rheumatoid arthritis. *Clin. Ortho.* **379**:288-299
98. Evans, C. H., Ghivizzani, S. C., Herndon, J. H., Wasko, M. C., Reinecke, J., Wehling, P., and Robbins, P. D. (2000) Clinical trials in the gene therapy of arthritis. *Clin. Ortho.* **379**:300-307
99. Evans, C. H., Ghivizzani, S. C., Smith, P., Shuler, F. D., Mi, Z., and Robbins, P.D. (2000) Using gene therapy to protect and restore cartilage. *Clin. Ortho.* **379**:214-219
100. Niyibizi, C., Smith, P., Robbins, P. and Evans, C. (2000) Potential of gene therapy for treating osteogenesis imperfecta. *Clin. Ortho.* **379**:126-133.
101. Oligino, T. J., Yao, Q., Ghivizzani, S. and Robbins, P. D. (2000) Vector systems for gene transfer to joints. *Clin. Ortho.* **379**:17-30.
102. Nishida, K., Gilbertson, L. G., Robbins, P. D., Evans, C. H., and Kang, J. D. (2000) Potential applications of gene therapy to the treatment of the intervertebral disc. *Clin. Ortho.* **379**:234-241.
103. Baltzer, A. W., Lattermann, C., Whalen, J. D., Ghivizzani, S., Wooley, P, Krauspe, R., Robbins, P. and Evans, C. H. (2000) Potential role of direct adenoviral gene transfer in enhancing fracture repair. *Clin. Ortho.* **379**: 120-125.
104. Evans, C. H. and Robbins, P. D. (2000) Gene therapy in orthopaedics. *Orth. Nursing* **19**:16-22
105. Evans, C. H., Ghivizzani, S. C., Oligino, T. A., and Robbins, P. D. (2000) Gene therapy for autoimmune disorders. *J. Clin. Immunol.* **20**:334-346
106. Evans, C. H., Thomson, A. W., Giannoukakis, N., and Robbins, P. D. (2000) Gene therapy for autoimmune disease and transplantation. *Therapeutic Immunosuppression.* , A. Thomson, Ed., Kluwer Press, In press
107. Radfar, A. J., Robbins, P. D., Huard, J., Rosas, F. R., Dohar, J. e. and Hebda, P. A. (2000) Transplantation of virally transduced cells into the dermis of immunocompetent and immunodeficient (SCID) mice to determine gene expression profile and differential donor cell survival. *Wound Repair Regen.* **8**:503-510
108. Srinivasula, S. M., Saleh, A., Robbins, P. D., and Alnemri, E. S. (2000) Isolation and characterization of caspases and their associated apoptosome complexes. In *Protocols in Cell Biology*, Academic Press, in press.
109. Evans, C. H., Ghivizzani, S. C., Herndon, J. H., Wasko, M. C., and Robbins, P. D. (2000) Gene therapy for arthritis: conception, consolidation and clinical trial. In *Modern Therapeutics in Rheumatoid Arthritis*, G. C. Tsokos, ed., Human Press Totowa, NJ

110. Mai, J. and Robbins, P. D. (2000) Targeting gene therapy for transplantation with venom. (Editorial). *Transplantation* **70**:1533-1534
111. Evans, C. H., Goldstein, S., Bonadio, J., Robbins, P. D., Baltzer, A. W. A., and J. Lieberman. (2000) Gene therapy for bone regeneration and repair. In press.
112. Ghivizzani, S. C., Oligino, T. J., Glorioso, J. C., Robbins, P. D., and C. H. Evans. (2001) Direct gene delivery strategies for the treatment of rheumatoid arthritis. *Drug Discov. Today* **6**:259-267
113. Gambotto, A., Cincinatti, V. R. and P. D. Robbins. Genetic engineering of dendritic cells. For inclusion in *The DC Handbook*, 2<sup>nd</sup> Edition, A. Thomson and M. T. Lotze, eds., in press
114. Giannoukakis, N and Robbins, P. D. (2000) Facilitating organ transplantation by gene therapy. *Molecular Interventions: Gene Therapy for the ICU*, P. Factor, Ed., Academic Press, in press
115. Robbins, P. D. (2001) IL-10 in tumor and autoimmunity. For inclusion in *Growth Factors & Cytokines*, G. Trinchieri, and M. Columbo, eds., in preparation.
116. Evans, C. H., Ghivizzani, S. C., Oligino, T. A., and Robbins, P. D. (2001) Future of adenoviruses in the gene therapy of arthritis. *Arthritis Res.***3**:142-146
117. Gouze, E., Ghivizzani, S. C., Robbins, P. D., and Evans, C. H. (2001) Gene therapy for rheumatoid arthritis. *Curr. Rheumatol. Rep.* **3**:142-146
118. Gouze, E., Ghivizzani, S. C., Robbins, P. D., and Evans, C. H. (2001) Therapie genique a portee de doigts. *La Recherche* **341**:40-43. In French
119. Trucco, M., Robbins, P. D., Thomson, A. and Giannoukakis, N. (2002) Gene therapy strategies to prevent autoimmune disorders. *Current Gene Therapy*, **2**:341-354.
120. Robbins, P. D., Jorgensen, C. and Evans, C. H. (2001) Gene therapy moves forward – Review of the Second International Meeting on Gene and Cell Therapies of Arthritis and Related Disorders. *Arthritis Res.* **3**:289-292
121. Gouze, J. N., Ghivizzani, S. C., Gouze, E., Palmer, G. D., Betz, O. B., Robbins, P. D., Evans, C. H. and Herndon, J. H. (2002) Gene therapy for rheumatoid arthritis. *Hand Surg.* **6**:176-182
122. Giannoukakis, N. and Robbins, P. D. (2002) Gene and cell based therapies for Diabetes Mellitus: Strategies and clinical potential. *Biodrugs.* **16**:149-173
123. Sfeir, C., Koch, H., Jadowiec, J. Robbins, P. D. and Hollinger, J. O. Gene therapy for the enhancement of fracture healing. In press
124. Palmer, G., Pascher, A., Gouze, E., Gouze, J.-N., Betz, O., Spector, M., Robbins, P. D., Evans, C. H., and Ghivizzani, S. C. (2002) Development of gene-based therapies for cartilage repair. *Critical Reviews in Eukaryotic Gene Expression*, in press
125. Robbins, P. D., Gambotto, A. and Storkus, W. J. (2002) Cytokine gene transfer in *The cytokine Handbook*, 4<sup>th</sup> Edition, M. Lotze and A Thomson, ed, Academic Press, in press
126. Robbins, P. D., Chernajovsky, Y and Evans, C. H. (2003) Rheumatoid arthritis in *Gene Therapy for Autoimmune disease*, in preparation

127. Robbins, P. D., Chernajovsky, Y and Evans, C. H. (2003) Gene therapy for arthritis in *Gene Therapy of Autoimmune Disease*, G. Prud'homme, ed, Landes Biosciences, in preparation
128. Evans, C. H. and Robbins, P. D. (2002) Gene therapy in *The Year in Rheumatology*. J. Gregory, ed., submitted
129. Robbins, P. D., Ghivizzani, S. C., Oligino, T., Mi, Z., and Evans, C. H. (2002) Vectors for gene and protein transfer for orthopaedic applications. *Molecular Biology of Orthopaedics*, in press.
130. Ghivizzani, S. C., Gouze, E., Robbins, P. D. and Evans, C. H. (2002) Gene delivery approaches for treating rheumatoid arthritis. *Molecular Biology of Orthopaedics*, in press
131. Evans, C. H., Ghivizzani, S. C., Herdon, J. H., and Robbins, P. D. (2002) Gene therapy for the treatment of orthopaedic diseases. Part 1: Basic principles and development of human gene therapy. *J. American Academy of Orthopaedic Surgeon*, in press

### Book Reviews

1. Robbins, P.D. and S. A. Khan. (1992) Review of **In Focus: DNA Replication** by R. I. P. Adams for the *Quarterly Review of Biology* 67:354.
2. Robbins, P. D. (1997) Review of **The Internet Book of Gene Therapy: Cancer Therapeutics**, R. Sobol and K Scanlon, Eds., *Nature Med.* 3:806
3. Robbins, P. D. (1999) Review of **Adenovirus Methods and Protocols**, W. Wold, Ed., Human Press, 1999 for *ASM News*. In press

### Books

1. Robbins, P. D. (1996) Editor. *Gene Therapy Protocols* Humana Press, Inc., Totowa, N. J., 1996
2. Evans, C. H. and P. D. Robbins, editors, (2000) *Gene Therapy for Inflammatory Diseases*, Birkhauser Verlag, Basel-Boston-Berlin
3. Robbins, P. D. and C. H. Evans, editors, (1999) section on Gene Therapy for Arthritis, for *Innovative Therapies and Diagnostics for Arthritis*, Telesymposia Proceedings, Prous Science, Barcelona, Spain.
4. Evans, C. H. and P. D. Robbins (2002) *Gene Therapy for Arthritis*, R. G. Landes Co, Austin, Tx. in preparation.
5. Robbins, P. D., and Dowdy, S, Editors (2003) *Protein Transduction: Characterization, Optimization and Application*. Kluwer Press, in preparation

### Other Publications

1. Robbins, P. D. (1985) Regulation elements in eucaryotic gene expression. Thesis. University of California, Berkeley, CA.

### Grant Support

#### Active

5R01 CA55227-11 (Robbins)	08/01/98-06/30/03	20%
NIH/NCI	\$154,503	
Regulation of Transcription by the Retinoblastoma Anti-oncogene		

The major goal of this project is to understand how the Rb tumor suppressor regulates transcription.

N01-AR-6-2225 (Robbins)	09/30/96-09/29/01	15%
NIH/NIAMS	\$308,426	
Gene Therapy for Rheumatic and Skin Diseases		

The overall aim of this contract is to use intra-articular gene transfer methodology to establish novel models of disease with which to access the role of specific proteins and agents in the pathogenesis of arthritis. **Not currently up for renewal.**

5P01 CA73743-03 (Lotze)	01/01/98-12/31/03	5%
NIH/NCI	\$75,398	
Dendritic Cell Biology and Therapy		
Vector Core		

2P01 DK44935-07A1 (Glorioso)	07/01/99-06/30/04	
NIH/NIDDK		
Model Systems Toward Development of Human Gene Therapy		
Project 2	\$112,000	10%
Virus Vector Core	\$65,806	5%
Administrative Core	\$37,000	5%

The role of the vector core in the model systems for development of human gene therapy program will be to construct and provide vectors expressing the appropriate genes for the proposed experiments. Administrative core deals with overall project management. The project studies the hypothesis that introduction of adenoviral vectors carrying vIL-10 into the intra- and peri-articular regions of the arthritic paws of mice results in the transduction of a leukocyte, probably a dendritic cell, with the ability to suppress disease.

JDFI (Trucco)	10/01/99-09/30/04	
Juvenile Diabetes Foundation	\$130,044 (core only)	5%
	\$99,668 (project)	10%
Synergy of Gene Therapy and Transplantation to Foster the Diabetes Cure		

ROBBIN00G0 (Robbins)	04/01/00-03/31/02	5%
Cystic Fibrosis Foundation	\$55,272	
Identification of Peptides that Facilitate Internalization into Airway Epithelial Cells		

The experiments outlined in this proposal should lead to identification of novel peptides that facilitate more efficient internalization into polarized epithelial cells that may be highly useful for improving the efficiency of gene transfer to human airway for treatment of cystic fibrosis by gene therapy.

MDA (Huard)	07/01/00-06/30/03	5%
Muscular Dystrophy Assn.	\$91,486	
Development of Approaches to Facilitate Expansion and Transplantation of Allogeneic Muscle Derived Stem Cells		

1U01 HL66949-01 (Glorioso)	09/28/00-08/31/05	5%
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NIH/NHLBI \$240,086  
 Supplement to Cardiovascular Gene Therapy Center Grant for Preclinical Vector Core

The primary objective of this portion of the cooperative agreement is to produce preclinical vectors for the principal investigators on the Cardiovascular Gene Therapy Center grant.

NIH (Rinaldo) 09/30/98-08/31/03 5%  
 5P01 AI43664-03 \$51,329 (Core only)  
 Antigen delivery for adjuvant HIV immunotherapy – Vector core  
 The major goal of this project is to provide vectors for adjuvant HIV immunotherapy.

NIH (Herberman) 08/01/99-07/31/04 5%  
 5P30 CA47904-13 \$60,087  
 Cancer Center Support Grant – Vector Core  
 The major goal of this project is to provide vectors to the members of the Cancer Center.

Maxygen Incorporated 08/01/01-07/31/02  
 \$85,000  
 Testing of “evolved” genes for regulating the immune response.

R21 DK62622 (Robbins) 9/30/02-9/29/04 10%  
 NIH/DK \$100,000  
 Analysis of peptide transduction to islets to improve function and viability

#### **Pending**

P01 NIH/NCI (Storkus) 07/01/01-06/30/06  
 Cytokine Mediated gene therapy of Cancer  
     Project 3 (PI) \$180,000 10%  
     Virus Vector Core (Co-PI) \$65,000 5%  
     Administrative Core (Co-PI) \$80,000 5%

The role of the vector core in the P01 is to develop vectors for cytokine gene therapy of cancer. Administrative core deals with overall project management. The project studies the ability of gene transfer of IL-18 and the IL-1 homologue IL-1H4 to stimulate the anti-tumor response.

R01 AR47828A1 (Robbins) 7/01/02-6/30/07 10%  
 NIH/NIAMS \$225,000  
 Application of peptide transduction domains for the treatment of hyperplastic synovium.

R01 CA97160 (Robbins) 7/01/02-6/30/07 10%  
 NIH/NCI \$225,000  
 Analysis of the anti-tumor effects of IL-18 and its homolog IL-1H4

#### **Department and University Committees**

Faculty Search Committee, Department of Molecular Genetics and Biochemistry, 1992-present  
 Co-Chairman, Departmental Seminar Series, 1992-1997  
 Member, Pittsburgh Cancer Institute, 1992-present  
 Director, Vector Core Facility, 1991-present  
 Institutional Biosafety Committee, Member, 1993-present  
 Organizer of 1993 Committee for Virology Symposium on Oncogenes, 1993  
 Pittsburgh Advisory Board, First International Congress of the Cell Transplant Society, 1991

Advisory Committee, Human Gene Therapy Applications Laboratory, 1993-present  
 Member, Internal Competitive Research Grant Review Committee, 1996,1997, 1998, 1999  
 Search Committee for Molecular Oncologist, UPCI, 1996-97  
 Evaluation Committee, Interdisciplinary Graduate Program (1997-)  
 MD/Ph.D. Supervisory Committee (1997-)  
 Recruiting Committee, Molecular Virology and Microbiology Program (1997-)  
 Evaluation Committee, Biochemistry and Molecular Genetics Graduate Program (1997-)  
 Interim Co-Director, Molecular and Cellular Oncology Program, UPCI (1997-2001)  
 Steering Committee, UPCI Cancer Genetics Program (1997-)  
 Member, Dickson/Mellon Prize Selection Committee (1999-present)  
 Member, Promotions Committee, Department of Cardiology (1999-present)  
 Molecular and Cellular Oncology Search Committee (2002)

### Graduate Students Trained

Di Jiang	Attorney, Jenner & Block (Chicago, IL)
Zhaohui Shao	Staff Scientist, Biogen Corporation
Dan Jaffurs	University of Pittsburgh Medical School
Jennifer Siebert	Assistant Professor, University of Pittsburgh (Greensburg)
Ali Radfar	University of Pittsburgh Medical School
Eric Lechman	current
Levent Balkir	current
Zoya Shurin	current
Annahita Keravala	current
Jeff Mai	current

### Postdoctoral Fellows Trained

Nicole Osifchin, M. D.	Oncology Fellow, Oregon Health Sciences Center.
Lisa Crossley, M. D.	Research Assistant Professor, Harvard Med. Sch.
Bettina Couderc, Ph.D.	Assistant Professor, University of Toulouse, France
Leslie Dougherty	Critical Care Fellow, San Antonio, Tx.
Laurence Zitvogel	Senior Staff Fellow, Institute Gustav Rousy
Jailila Adnane, Ph.D.	Research Assistant Professor, Moffitt Cancer Center, Tampa, FL
Steve Ghivizzani, Ph.D.	Assistant Professor, Harvard Medical School
John Rushton, Ph.D.	Post-doctoral Fellow, University of New Mexico
Axel Baltzer, M.D.	Assistant Professor, Dusseldorf, Germany
Andrea Gambotto, M.D.	Assistant Professor, Department of Surgery, University of Pittsburgh
Janey Whalen, Ph.D.	Research Instructor, Department of Urology, University of Pittsburgh
Nicholas Giannoukakais, Ph.D.	Assistant Professor, Department of Pathology, University of Pittsburgh
Manuel Serrano, M.D.	Madrid University
Sujing Wang, Ph.D.	Senior Research Associate, Department of Orthopaedics,
Ayman Saleh, Ph.D.	
Moiria Resnick, Ph.D.	current
Zhibao Mi, Ph.D.	current
Khaleel Rehman, Ph.D.	current
Seon Hee Kim, Ph.D.	current
Qingping Yao, M.D.	current
Wentao Gao, Ph.D.	current
XiaoLi Lu, Ph.D.	current
Rajasree Menon, Ph.D.	current
James Vaughn Spencer, Ph.D.	current

Enrico Palo, M.D. current  
Hiroyuki Mushiake, M.D., Ph.D. current

### **Extracurricular Activities**

#### **Committees**

Chair, ASGT Committee on Musculoskeletal Diseases  
Member, ASGT Membership Committee

#### **Study Sections**

Ad Hoc Member of Molecular Biology and Genetics Study Section,  
American Cancer Society (1991).  
Temporary Member, Cell Biology and Physiology (CBY2) Study Section (June, 1996)  
Member, NCI Special Review Committee for the Fourth International Gene Therapy of Cancer  
Conference, San Diego Regional Cancer Center (1995, 1997)  
Member, Army Breast Cancer Human Genetics (Gen-1) Study Section (1996-2000)  
Reviewer for NIH-NINDS RFP 96-06  
Temporary Member, NCI SRG Subcommittee D, Clinical Research Studies (1997, 1998)  
Special Review Committee, Gene therapy approaches for cystic fibrosis and other heart, blood  
and lung diseases. (1997, 1998)  
Special Review Committee, Gene Therapy for Hemoglobinopathies, NIH HBL (1999)  
Temporary Member, PathB Study Section (1999-2000)  
Member, PathB Study Section (2001-2005)  
Quick Trials for Prostate Cancer Special Study Section (1999, 2000)  
Urology Spore Study Section (2001)  
Member, Italian Telethon Study Section (2001-2004)  
Scientific Review Board, National Gene Vector Laboratory, (1998-)  
Chair, Review Committee (NIDDK) "Improved methods for production of clinical gene therapy  
vectors for diseases of interest to NIDDK"  
Juvenile Diabetes Foundation, Islet Encapsulation Grant Review (May 2000)  
JDRF/Telethon Review Board (June 2002)

#### **Site Visits**

Member, AIBS Site Visit, USAMRMC Neurofibromatosis Program, Richmond, VA (May 1995)  
Member, NCI PO1 Site Visit, M.D. Anderson (1997)  
Member, NCI Teleconference Site Visit, University of Michigan Medical Center, (1997)  
Member, NCI PO1 Site Visit, University of Michigan Medical Center, Ann Arbor, MI (1997)  
Member, NCI PO1 Teleconference Site Visit, Memorial Sloan Kettering Cancer Center (1997)  
Member, NCI PO1 Site Visit, City of Hope National Medical Center (1999)  
Member, NIC PO1 Site Visit, Memorial Sloan Kettering (2000)  
Member, JDRF Site Visit, Univ. of Pennsylvania (October, 2002)

#### **Memberships**

Member, American Association for the Advancement of Science  
Member, American Society for Microbiology  
Member, American Association for Gene Therapy  
Member, Tissue Engineering Society  
Member, American Association for Cancer Research

#### **Editorials Boards:**

Associate Editor, *Cancer Research*  
Associate Editor, *Gene Therapy*  
Editorial Board, *Molecular Biotechnology*  
Editorial Board, *Gene Therapy and Molecular Biology*  
Editorial Board, *Journal of Gene Medicine*



Editorial Board, *Cancer Gene Therapy*  
Editorial Board, *Arthritis Research*  
Editorial Board, *Genes & Immunity*

### **Consulting**

Consultant; Theragen, Inc. (1992-1994)  
Consultant; Genvec, Inc. (1994-1996)  
Consultant, Cell Genesys (1997-1998)  
Consultant, Valentis Corporation (Formerly Megabios) (1998-2002)  
Scientific Advisory Board, Copernicus Gene Systems (1997-1998)  
Scientific Advisory Board, Ansata Therapeutics (2002-)  
Scientific Advisory Board, Orthogen, Inc (2002- )

### **Meetings Organized and Sessions Chaired**

Session Chair, IBC Conference on Gene Therapy III (1994)  
Session Chair, IBC Conference on Gene Therapy IV (1994)  
Session Chair, IBC Conference on Gene Therapy V (1995)  
Session Chair, 3rd DAAK/GAAC Meeting on Problems in Molecular Medicine (September 1997)  
Co-Organizer, 1<sup>st</sup> Meeting on Gene Therapy for Arthritis and Related Musculoskeletal Diseases  
Session Chair, 1<sup>st</sup> Meeting on Gene Therapy for Arthritis and Related Musculoskeletal Diseases  
Session Chair (Connective Tissue Gene Transfer), American Society of Gene Therapy, 1999  
Session Chair, Gene Therapy and the Musculoskeletal System (September, 2000), Berne, Switzerland  
Co-Organizer, 2<sup>nd</sup> International meeting on Gene Therapy for Arthritis and Related Musculoskeletal Diseases, Montpellier, France, (May, 2001)  
Co-Organizer and Session Chair, Viral Gene Vectors: Molecular Biology, Design and Application to Gene Therapy, Banff, Canada (April, 2001)  
Chairman and organizer, 2001 ASGT Symposium on Musculoskeletal Disorders  
Session Chair, Peptide Transduction, Protein Transduction Strategies Workshop, NIH  
Chairman and organizer, 2002 ASGT Education Program on Gene Transfer to Joints  
Chairman and organizer, 2002 ASGT Workshop on Cartilage and Bone Healing  
Co-Organizer, Rational Gene Therapy: the next five years, Banff, Canada (February, 2003)

### **Honors and Awards**

Magill-Rhodes Scholarship, Haverford College, 1976-1980  
High Honors in Biology, Haverford College, 1980  
Jane Coffin Childs Memorial Fund for Medical Research Fellowship, 1986-1989  
Department of Molecular Genetics and Biochemistry Faculty of the Year, 1998  
Volvo Award Prize for Best Basic Science Paper in lower back pain research (1999)  
North American Spine Society Award for a 1999 Outstanding Paper  
Founder's Award Prize from the Eastern Orthopaedic Association for outstanding paper (1999)  
Gerhard-Kuntscher-Preis 1999  
Synos Research Award 2000

### **Teaching**

#### **1992-93**

Advanced Graduate Course BIOSC 2030, MSMIC2030	14 hours
Advanced Molecular Genetics (MSMIC 2250)	2 hours
MD Training Program (MSBIO 5130)	2 hours lecture
	14 hours PBL

#### **1993-94**

Advanced Molecular Genetics (MSMIC 2355)	4 hours lecture
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MD Training Program (MSBIO 5130)	2 hours conference
Advanced Topics in Virology (Viral Vectors)	9 hours PBL
Receptors and Signal Transduction (MSPHL)	26 hours
Cancer Biology (MSMIC 2453)	2 hours lecture
Cell Biology and Physiology	1 hour lecture
	2 hour lecture
<b>1994-95</b>	
Advanced Molecular Genetics (MSMIC 2355)	4 hours lecture
MD Training Program (MSBIO 5130)	2 hours conference
Advanced Topics in Virology	2.5 hours lecture
Receptors and Signal Transduction (MSPHL 3510)	11 hours PBL
Cancer Biology (MSMIC 2453)	3 hours lecture
	1.5 hours lecture
	1 hour PBL
	2 hours lecture
<b>1995-96</b>	
Advanced Molecular Genetics (MSMIC 2355)	4 hours Lecture
MD Training Program (MSBIO 5130)	2 hours PBL
Receptors and Signal Transduction (MSPHL 3510)	11 hours PBL
Cancer Biology (MSMIC 2453)	2.5 hours conference
Advanced Topics in Virology	1.5 hours lecture
	1 hour conference
	1 hour lecture
	12 hours lecture
	18 hours conference
<b>1996-1997</b>	
Advanced Molecular Genetics (MSMIC 2355)	2 hours Lecture
MD Training Program (MSBIO 5130)	1 hours PBL
Receptors and Signal Transduction (MSPHL 3510)	3 hours lecture
Eucaryotic Molecular Genetics (MSBMG 2520)	12 hours PBL
	2.5 hours conference
	1.5 hours lecture
	1 hour conference
	4 hours lecture
<b>1997-98</b>	
Advanced Molecular Genetics (MSMIC 2355)	4 hours lecture
MD Training Program (MSBIO 5130)	2 hours PBL
Eucaryotic Molecular Genetics (MSBMG 2520)	1 hour lecture
Cancer Biology (MSMIC 2453)	12 hours PBL
Advanced Topics in Virology (MSMVM)	2.5 hours conference
	4 hours lecture
	4 hour lecture
	3 hours lecture
<b>1998-99</b>	
Advanced Molecular Genetics (MSMIC 2355)	2 hours lecture
MD Training Program (MSBIO 5130)	1 hour lecture
	12 hours PBL
	2.5 hours conference

Eucaryotic Molecular Genetics (MSBMG 2520)	8 hours lecture
(Course Director)	
Advanced Topics in Virology (MSMVM)	3 hours lecture
Advanced Topics in Virology (MSMVM)	10 hours lecture
(Course Director)	

#### 1999-00

Advanced Molecular Genetics (MSMIC 2355)	2 hours lecture
	1 Hour Discussion
MD Training Program (MSBIO 5130)	1 hour lecture
Human Genetics	1.5 hours lecture
Cancer Biology (Pathology)	3 hours Lecture
Eucaryotic Molecular Genetics (MSBMG 2520)	4 hours lecture

#### 2000-01

Cancer Biology (MSMIC 2453)	4 hour lecture
Advanced Topics in Virology (MSMVM)	3 hours lecture
Advanced Molecular Genetics (MSMIC 2355)	2 hours lecture
	1 Hour Discussion
Training Program (MSBIO 5130)	1 hour lecture
Human Genetics	1.5 hours lecture

#### Invited Seminars

- Tufts Medical School (1989) *Regulation of transcription during stem cell differentiation*
- Duke Medical School (1989) *Regulation of c-fos transcription and AP1 activity by the retinoblastoma anti-oncogene product*
- University of California, Santa Cruz (1990) *Regulation of c-fos transcription and AP1 activity by the retinoblastoma anti-oncogene product*
- University of Vermont (1990) *Regulation of c-fos transcription and AP1 activity by the retinoblastoma anti-oncogene product*
- National Cancer Institute (1990) *Regulation of c-fos transcription and AP1 activity by the retinoblastoma anti-oncogene product*
- McCardle Cancer Center, University of Wisconsin at Madison. (1990) *Regulation of transcription by the retinoblastoma anti-oncogene product*
- Pittsburgh Cancer Institute (1991) *Regulation of transcription by the retinoblastoma anti-oncogene product*
- University of Pittsburgh School of Medicine, Department of Pharmacology. (1991) *Regulation of transcription by the retinoblastoma gene product and p53*
- University of Pittsburgh School of Medicine, Department of Human Genetics (1991) *The retinoblastoma susceptibility gene: regulation of expression and function of the gene product*
- Pittsburgh Cancer Institute (1991) *The regulation of transcription by the retinoblastoma and p53 tumor suppressor gene products*
- Wistar Institute (1991), Philadelphia, PA, *The regulation of transcription by the retinoblastoma and p53 tumor suppressor gene products*
- Merck Cancer Research Laboratory, West Point, PA (1992) *The regulation of transcription by the retinoblastoma anti-oncogene and cyclins.*
- Gene Therapy Meeting, Cold Spring Harbor Laboratory (1992) *Intraarticular expression of IL-1 receptor antagonist protein by gene transfer: gene therapy for arthritis.*
- XIIIth European Workshop for Rheumatology Research (1993), Brighton, England, *Gene Therapy for Arthritis,*
- Brookdale Laboratory for Molecular Biology, Mt Siani School of Medicine (1993) *Regulation*

- of transcription by the retinoblastoma and p53 tumor suppressor gene products and cyclins*
- MD Anderson (1993) *Regulation of transcription by the retinoblastoma and p53 tumor suppressor gene products*
- New York Academy of Sciences Meeting on Gene Therapy for Neoplastic Diseases (1993), Washington D. C., *Retroviral vectors for human gene therapy*
- Orthopaedic Research Society (February, 1994), New Orleans, LA, *Vectors for Gene Therapy*
- Gene Therapy and Immunotherapy of Cancer (February, 1994), Ein Gedi, Israel, *Gene therapy for cancer and autoimmune diseases*
- Experimental Biology Meeting (April, 1994), Anaheim, CA, *Human gene therapy - Implications in inflammation*
- Cambridge Healthtech Institute Conference on Gene Therapy: New Technologies and Applications (1994), Bethesda, MD, *Gene Therapy for Inflammatory Diseases*.
- IBC USA Conference on Gene Therapy (April 1994), Washington, D. C., *Gene Therapy for Arthritis*.
- Multipurpose Arthritis Center Symposium, University of Michigan (May, 1994) *Viral and non-viral vectors for gene therapy of arthritis*
- Burroughs-Wellcome, Research Triangle Park, N.C. (June, 1994) *Gene therapy for arthritis*
- Repligen, Inc., Boston, MA (May, 1994) *Gene therapy of cancer using interleukin-12 and B7*.
- Hoffman LaRoche (August, 1994) *Gene therapy for arthritis and cancer: From the laboratory to the clinic*
- Symposium on Gene Therapy, Michigan State University (September, 1994) *Gene therapy for arthritis*
- Magee-Womens Research Institute, Pittsburgh, PA. (1994) *Regulation of transcription by the retinoblastoma tumor suppressor protein*.
- Annual Meeting of the Korean Society for Molecular Biology, Seoul Korea (October 1994) *Gene therapy for cancer and inflammatory diseases*.
- IBC Conference on Gene Therapy, Washington, D.C. (November, 1994) *Gene therapy for arthritis: From the laboratory to the clinic*.
- European Working Group on Human Gene Transfer and Therapy, London, England (November, 1994) *Gene therapy for arthritis*.
- Wayne State University (January 1995) *Advances in Gene Therapy for Cancer and Arthritis*.
- Max-Delbrück Conferences: Symposium on Gene Therapy, Berlin (April 1995) *Advances in development of gene therapies for inflammatory diseases*.
- American Society for Microbiology Annual Meeting, Symposium on Immunotherapy, Washington, D. C. (May 1995), *Gene Therapy for Arthritis*.
- IBC Conference on Gene Therapy, Washington, D.C. (May, 1995) *Gene therapy for inflammatory Diseases*
- Howard University Workshop, DNA Technology: Gene Therapy (May 1995) *Gene Therapy for Arthritis*
- Symposium on Gene Therapy, Seoul National University, Seoul, Korea (June 1995) *Immunomodulation by Gene Transfer: Development of gene therapies for arthritis and cancer*.
- Samsung Medical Center, Seoul, Korea (June 1995) *Gene therapy for arthritis and cancer*
- Somatix Corporation, Alameda, CA (October 1995) *Development of gene therapies for cancer and arthritis*.
- Cell Genesys, Inc., Foster City, CA (October 1995) *Immunomodulation by gene transfer: Development of gene therapies for arthritis and cancer*.
- San Diego Conference on DNA, San Diego, CA (November, 1995) *Vector systems for gene therapy*
- Luneburg Symposium on Interdisciplinary Approaches to Gene Therapy, Luneburg, Germany (March 1996) *Development of gene therapies for arthritis and cancer*
- Seoul National University, Seoul, Korea (April 1996) *Gene therapy for arthritis and cancer*

- Pasteur Institute, Paris, France (May, 1996) *Development of gene therapies for arthritis and cancer*
- University of Toulouse, Toulouse, France (May, 1996) *Gene Therapy for arthritis and cancer*
- Rhone-Poulenc Rorer, Paris France (May, 1996) *Gene therapy for arthritis and cancer*
- University of Pittsburgh, Department of Pathology (June 1996) *Immunomodulation by gene transfer: Development of gene therapies for arthritis and cancer.*
- University of Florida (June 1996) *Immunomodulation by gene transfer: Development of gene therapies for arthritis and cancer.*
- Conference on Current and Future Management of Duchenne Muscular Dystrophy, Pittsburgh, PA (June 1996) *Gene Therapy for Arthritis*
- Cold Spring Harbor Symposium on Cancer Genetics and Tumor Suppressor Genes (August 1996) *Regulation of Transcription by Rb and Cyclin D1 Through Interaction with TAF<sub>II</sub>250.*
- University of Pittsburgh, Department of Human Genetics (September 1996) *Transcriptional regulation by the retinoblastoma tumor suppressor gene product.*
- Ariad, Inc., Cambridge, MA (October 1996) *Gene therapy for arthritis.*
- New York Academy of Sciences, Gene Therapy for Arthritis, New York, NY (January, 1997) *Vectors for gene therapy of arthritis.*
- Moffit Cancer Center, Tampa, FL (February, 1997) *Transcriptional regulation by the retinoblastoma and p53 tumor suppressor gene product. invited*
- University of Minnesota, Department of Human Genetics, (May, 1997) *Progress towards development of gene therapies for arthritis and cancer. invited*
- IBC Conference on Gene Therapy: Clinical advances and Vector Development, Bethesda, MD (May 1997) *Clinical application of retroviral vectors for gene therapy of cancer and arthritis. invited*
- American Red Cross, Washington, D.C. (May, 1997) , *Progress towards development of gene therapies for arthritis*
- Canadian Gene Therapy Symposium, Vancouver, British Columbia. (June, 1997) *Progress towards development of gene therapies for arthritis and cancer.*
- Boehringer Ingelheim, Ridgefield, CT (July 1997) *Progress towards development of gene therapies for autoimmune diseases.*
- Megabios Corp., Burlingame, CA (July 1997) *Progress towards development of gene therapies for arthritis: preclinical and clinical studies.*
- Introgen Therapeutics, Houston, TX (July 1997) *Progress towards development of gene therapies for arthritis: preclinical and clinical studies.*
- 3rd DAAK/GAAC Meeting on Problems in Molecular Medicine: Progress in Vector Development and Application to Treatment of Human Disease by Gene Therapy, Kloster Irsee, Germany (September 1997) *Viral Vectors for gene transfer to joints, invited*
- University of Toronto, Toronto, Canada (October 1997) *Progress towards development of gene therapies for arthritis preclinical and clinical studies. invited.*
- IBC Conference on Arthritis, New Orleans (November 1997) *Progress towards development of gene therapies for arthritis preclinical and clinical studies. invited.*
- 18th Annual Meeting Japanese Society of Inflammation, Tokyo, Japan (November 1997) *Progress towards development of gene therapies for arthritis*
- Japanese Rheumatism Association, Tokyo, Japan (November 1997) *Progress towards development of gene therapies for arthritis*
- San Diego Conference on DNA, San Diego, CA (November, 1997) *Progress towards development of gene therapies for arthritis and cancer.*
- Sloan Kettering Memorial Cancer Center (January 1998) *Gene therapy for arthritis*
- University of Kentucky (April 1998) *Gene therapy for arthritis and cancer.*
- Human Genome Sciences, Inc. (March 1998) *Progress towards development of gene therapies for arthritis Preclinical and clinical studies. invited.*

- Symposium on Tissue Engineering Cryo 98, Pittsburgh, PA (July, 1998) *New advances in gene therapy for arthritis*. Invited
- American Society for Gene Therapy, Seattle, Washington (May 1998) *Gene therapy for arthritis*, Invited.
- International Conference on Gene Therapy and Molecular Biology, Crete, Greece (August, 1998) *Gene therapy for arthritis: preclinical and clinical studies*. Invited.
- Symposium on Gene Therapy, Seoul, Korea (October, 1998) *Gene transfer to block inflammation and facilitate transplantation*.
- 1<sup>st</sup> Meeting on Gene Therapy for Arthritis and Related Musculoskeletal Diseases, Washington, DC, (December, 1998) *Meeting Summary*
- University of Alabama at Birmingham (April 1999) Immunomodulation by Gene Transfer: Recent progress towards treating autoimmune diseases and cancer by gene therapy
- University of Pittsburgh, Department of Molecular Genetics and Biochemistry, Faculty of Year Lecture (April 1999) Immunomodulation by gene transfer: Progress towards development of gene therapies for autoimmune disease and cancer.
- 2<sup>nd</sup> International Workshop on IL-10, Milan, Italy (May 1999) *Progress toward development of IL-10-mediated gene therapies for arthritis and cancer*.
- 4<sup>th</sup> World Congress on Inflammation, Paris, France (June 1999) *Gene transfer to joints: Development of novel animal models and therapies for arthritis*.
- AO Meeting on Orthopaedic Gene Therapy, Davos, Switzerland (September 1999) *Overview – Orthopaedic Gene Therapy*, invited
- 1999 American College of Rheumatology Annual Meeting, Frontiers in Basic Research Course – Gene Therapy, Boston, MA (November 1999) *Gene transfer to joints: progress towards development of a gene therapy for arthritis*.
- 1999 American College of Rheumatology Annual Meeting, Boston, MA (November 1999) *Results of a Phase I trial gene therapy trial for arthritis*.
- SmithKline Beechum, Malvern, PA (November, 1999) *Gene therapy for arthritis*
- National Institutes of Health, Bethesda, MD (November, 1999) *Immunomodulation by gene transfer: progress towards development of gene therapies for autoimmune diseases and cancer*.
- Japanese Society for Biological Therapy, Yokohama, Japan (December 1999) *Immunomodulation by gene transfer: Progress towards development of gene therapies for cancer and arthritis*.
- Pittsburgh Orthopaedic Tissue Engineering Symposium, Pittsburgh, PA (April 2000) *Gene therapy approaches for treating bone and joint disorders*, invited
- University of Vermont, Burlington, VT, (April, 2000) Progress towards development of gene therapies for autoimmune diseases and cancer; Pre-clinical and clinical studies.
- Pacific West Cancer Fund Symposium, Pittsburgh, PA (May 2000) Peptide Mediated Delivery of Proteins for Cancer Therapy.
- American Society of Transplantation, Chicago, Illinois (May, 2000) *Gene therapy for transplantation*.
- 15<sup>th</sup> Annual Orthopaedic Research Meeting of the Japanese Orthopaedic Association, (September, 2000) Kyoto, Japan
- Kyoto Prefectural University, Kyoto, Japan (September, 2000) *Transcriptional regulation by Rb*.
- Gene Therapy and the Musculoskeletal System (September, 2000), Berne, Switzerland, *Gene therapy for arthritis: preclinical studies*.
- American Society for Histocompatibility and Immunogenetics, (October, 2000) Orlando, FL, *Gene therapy for autoimmune diseases and transplantation*.
- Cytokines and Cancer, AACR Meeting in Vail, CO (September, 2000) *IL-10 and IL-10 homologues in cancer*.
- Duquesne University, Pittsburgh, PA (October, 2000) *Gene and protein based therapies for arthritis and cancer*.

- Maxygen, Redwood City, California, (December 2000) *Gene and protein-based therapies for autoimmune disease, cancer and viral infection.*
- University of Massachusetts Medical School, Worcester, MA (January, 2001) *Progress toward development of gene and protein based therapies for autoimmune diseases and cancer: Preclinical and clinical studies.*
- Dartmouth Medical School, Hanover, NH (March, 2001) *Gene and protein based therapies for autoimmune diseases and cancer.*
- LSU, New Orleans (February, 2001) *Gene therapy for cancer and autoimmune diseases*
- Deltagen, Redwood city, California (March, 2001) *Peptide-mediated protein delivery for treatment of arthritis and cancer.*
- University of Pittsburgh, Department of Environmental Health and Molecular Toxicology, (March, 2001) *Progress toward development of gene and protein based therapies for autoimmune diseases and cancer: Preclinical and clinical studies.*
- Viral Gene Vectors: Molecular Biology, Design and Application to Gene Therapy (April, 2001), Banff, Canada, *Gene therapy for arthritis*, invited
- Eye and Ear Institute, Pittsburgh, PA (April, 2001) *Immunomodulation by gene transfer.*
- American Association of Orthopaedic Surgeons, San Francisco (March, 2001) *Gene therapy for orthopaedic applications*
- ASM meeting on Viral Gene Vectors: Molecular Biology, Design and Application to Gene Therapy, Banff, Canada (April, 2001) *Gene therapy for arthritis*
- 2<sup>nd</sup> International Meeting on Gene Therapy for Arthritis and Related Disorders, Montpellier, France (May 2001) *Viral and peptide mediated intra-articular transfer of genes and proteins*
- 2<sup>nd</sup> International Meeting on Gene Therapy for Arthritis and Related Disorders, Montpellier, France (May 2001) *Update on the contralateral effect in rabbit and mouse models.*
- Valentis Symposium, 4<sup>th</sup> Annual Society for Gene Therapy Meeting, Seattle, WA (May 2001) *Delivery of Apoptotic Genes for the Treatment of Arthritis*
- Genzyme Corporation, Framingham, MA (August, 2001) *Gene therapy for arthritis: Preclinical and clinical studies.*
- NIH workshop on Orthopaedics, Scottsdale, AZ (September, 2001) *Vectors for Gene Transfer*
- Avigen, Inc., San Francisco, CA (August, 2001) *Gene therapy for arthritis.*
- Carnegie Mellon University, Pittsburgh, PA (September, 2001) *Gene therapy for acquired diseases: current status and future directions.*
- Grand Rounds, University of Massachusetts Medical Center, Department of Medicine (October 2001) *Gene therapy for arthritis: Preclinical and Clinical Studies.*
- Pulmonology Grand Rounds, University of Pittsburgh, (October 2001) *Gene therapy for arthritis: Preclinical and Clinical Studies.*
- Institute for Human Gene Therapy, University of Pennsylvania, (October, 2001) *Gene and protein based therapies for autoimmune diseases and cancer.*
- University of South Florida, Tampa, FL (October, 2001) *Gene therapy for arthritis*
- Focus on Diabetes, Erice, Sicily (December, 2001) *Gene therapy for Diabetes.*
- University of Michigan, Ann Arbor, MI (January, 2002) *Gene and protein based therapies for autoimmune diseases and cancer*
- National Cancer Institute, Protein Transduction Strategies Workshop, (February, 2002) *Characterization and optimization of peptide mediated transduction*
- Roswell Park Cancer Center, Buffalo, NY (March 2002) *Gene and protein based therapies for autoimmune diseases and cancer: Preclinical and Clinical studies.*
- Eli Lilly Pharmaceuticals (February, 2002) *Animal models of arthritis for the analysis of gene and proteins based therapies*
- Locus Discovery, Philadelphia, PA (April, 2002) *Animal models of arthritis for the analysis of gene and proteins based therapies*
- Seoul National University Symposium on Gene Therapy (May, 2002) *Gene and protein based therapies for arthritis: Preclinical and clinical studies.*

- 4<sup>th</sup> Annual American Society of Gene Therapy Meeting, Boston, MA (June, 2002) *Gene transfer to joints*
- 7<sup>th</sup> JDRF Meeting on Diabetes, Oxford, England (August, 2002) *Gene and protein based strategies to facilitate islet transplantation.*
- 2<sup>nd</sup> Annual Meeting of the Federation of Clinical Immunology Societies, San Francisco, CA (July, 2002) *Gene therapy for arthritis.*
- 15<sup>th</sup> Naito Conference on Molecular Biological Approaches for Intractable Diseases, Tokyo, Japan (October, 2002) Invited
- Annual Meeting of the American College of Rheumatology, New Orleans, LA (October, 2002) Invited

### Clinical Protocols

1. Gene Therapy for Gaucher Disease: Ex Vivo Gene Transfer and Autologous Transplantation of CD34<sup>+</sup> Cells. Co-Investigator. Principal Investigator, John A. Barranger; Initiated 9/95
2. Clinical trial to assess the safety, feasibility, and efficacy of transferring a potentially anti-arthritic cytokine gene to human joints with rheumatoid arthritis. Co-Principal Investigator. Principal Investigator, Chris H. Evans. Complete
3. IL-12 gene therapy using direct injection of tumors with genetically engineered autologous fibroblasts. Co-Principal investigator. Principal Investigators, Hideaki Tahara, Michael T. Lotze; Completed.
4. IL-12 gene therapy for patients with cancer using direct injection of tumors with genetically engineered autologous dendritic cells (Phase I/II). Co-investigator. H. Tahara, Principal Investigator.
5. Phase II trial of IL-12 gene therapy for head and neck cancer using direct injection of tumors with genetically engineered autologous fibroblasts. Co-investigator. M. Lotze, Principal Investigator,
6. IL-12 gene therapy for melanoma using direct infection of tumors with genetically engineered autologous fibroblasts (phase II study). Co-investigator. M. Lotze, Principal Investigator.
7. Gene therapy of malignant gliomas: A phase I study of IL-4-HSV-TK gene modified autologous tumor to elicit an immune response. Co-investigator. I. Pollack, Principal Investigator.

### Patents

- Retroviral Vectors Useful for Gene Therapy.* Inventors: P. Robbins, B. Guild, L. Rafield, L. Cohen and R. Mulligan. Somatix Therapy Corporation. Australian Patent No. 659824. Issued 9-19-95
- IRAP gene as a treatment for arthritis* Inventors: J. C. Glorioso, C. H. Evans, and P. D. Robbins. University of Pittsburgh. United States Patent #5,858,355, January 12, 1999
- Gene transfer for studying and treating a connective tissue of a mammalian host* Inventors: J. C. Glorioso, C. H. Evans, and P. D. Robbins. University of Pittsburgh. United States Patent #6,156,304, December 5, 2000



*Viral vectors to inhibit leukocyte infiltration or cartilage degradation of joints* Inventors: J. C. Glorioso, C. H. Evans, P. D. Robbins and S. C. Ghivizzani. University of Pittsburgh. United States Patent #6,159,464, December 12, 2000

*Gene Therapy for Gaucher Disease.* Inventors: J. Barranger and P. Robbins. University of Pittsburgh, Issued.

*Systemic gene treatment of connective tissue diseases with IRAP-1.* Inventors: C. H. Evans and Paul D. Robbins. United States Patent #5,766,585 June 16, 1998

*Retroviral Gene Therapy Vectors and Therapeutic Methods Based Thereon.* Inventors: I. Riviere, L. K. Cohen, B. Guild, L. Rafield, P. Robbins, and R. Mulligan. Somatix Therapy Corporation. PCT Publication No WO 95/34669.

### ***Applications***

*Genetic Modification of Endothelial Cells.* Inventors: R. Mulligan, L. Birinyi, A. D. Callow, L. K. Cohen, B. C. Guild, L. F., P. Robbins and J. Wilson. Somatix Therapy Corporation. Priority US 607,252. Abandoned.

*Gene Treatment of Arthritis.* Inventors: J. C. Glorioso, C. H. Evans, and P. D. Robbins. University of Pittsburgh. Priority US 07/630,981

*A cytoplasmic gene expression system which utilizes a prokaryotic RNA polymerase autogene.* Inventors: L. Huang, P. Robbins, D. Jaffurs, M. Brisson, S. Li, and J. Yang. Priority US 2710-4003.

*Gene Transfer to intervertebral disc cells.* Inventors: J. Kang, K Nishida, C. Evans and P. Robbins. University of Pittsburgh 9/199,978

*Gene transfer to islets to inhibit dysfunction and block apoptosis.* Inventors: P. Robbins, M. Trucco and N. Giannoukakis.

*Identification of peptides that facilitate uptake and nuclear transport of proteins, DNA and viruses.* Inventors: P. Robbins, Z. Mi, and R. Frizzell

*Cartilage repair gene therapy.* Inventors: C. Evans, S. Ghivizzani, and P. Robbins

*The use of oligodeoxyribonucleotide decoys to modify antigen presenting cells as a means of inhibiting immune stimulation.* Inventors: P. Robbins, L. Lu and N. Giannoukakis.

*Viral and non-viral vectors as vehicles for delivering transgenes for treating bone pathologies* Investors: A. Baltzer, C. Evans, and P. D. Robbins, US Patent Applications 09/561,524.